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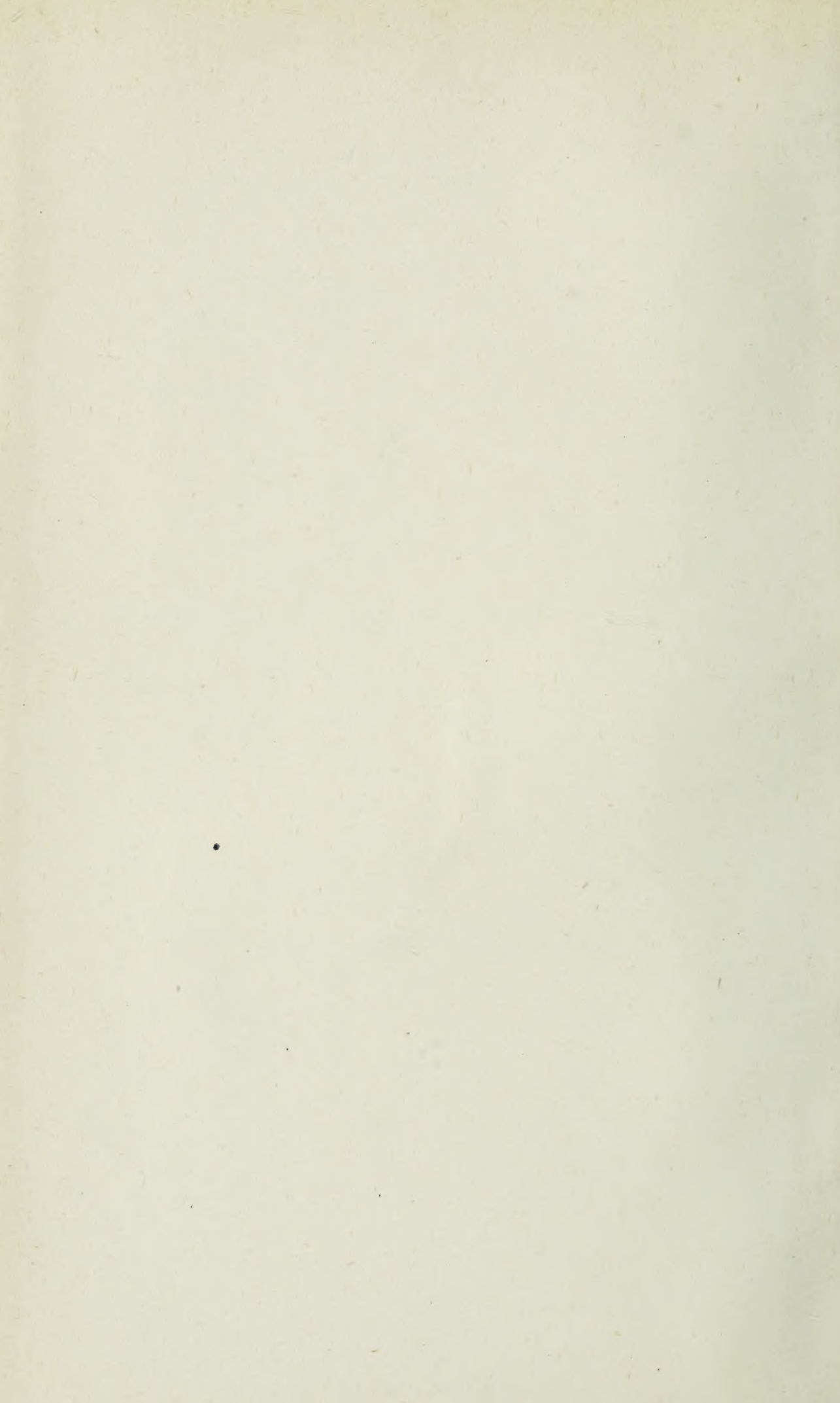


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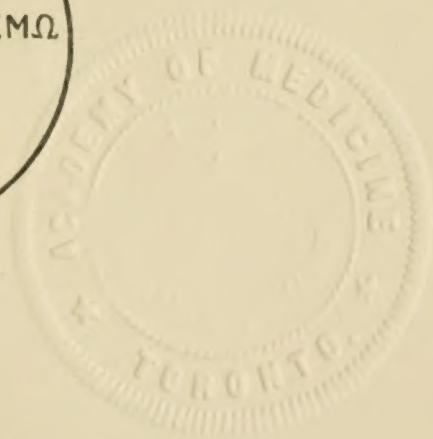
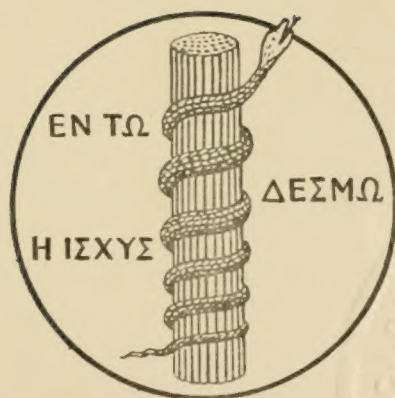
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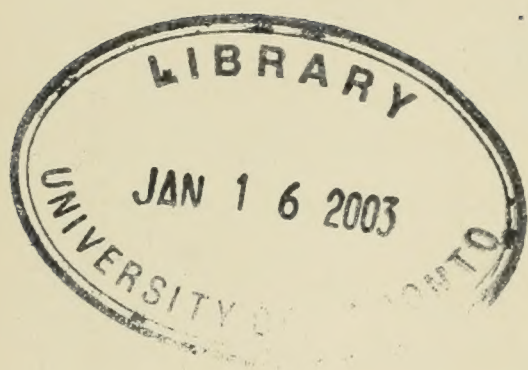
NEW SERIES

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EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

CASUALTIES.

KILLED in action, Captain HENRY BEGG, M.B., R.A.M.C.

Captain Begg received his medical education at the University of Aberdeen, where he graduated M.B., Ch.B. in 1906. Prior to the war he was in practice in Kentish Town, London.

KILLED in action, Captain JAMES D. FORRESTER, R.A.M.C.

Captain Forrester graduated M.B., Ch.B. of Edinburgh University in 1912. Prior to receiving his commission he was in practice at Peebles.

DIED of wounds on 7th November, Lieutenant JOHN RITCHIE BROWN, R.A.M.C., aged 43.

Lieutenant Brown was educated at Glasgow University, where he graduated M.B. and C.M. in 1897. He served as a civil surgeon in the South African War, after which he acted as district surgeon in Southern Rhodesia under the British South Africa Company.

DIED on service, Lieutenant-Colonel C. S. RUNDLE, I.M.S., on 11th November, aged 62.

Lieutenant-Colonel Rundle was educated at Edinburgh University, where he graduated M.B. and C.M. in 1877, and entered the Indian Medical Service as surgeon in 1880. He retired in 1907, but volunteered for service at the beginning of the war, and when a camp for prisoners of war was opened in Jersey he was appointed to its medical charge.

DIED on service, Surgeon HERBERT MATHER JAMIESON, R.N., at Malta, on 26th September 1915, aged 33.

Surgeon Jamieson graduated M.B. at Aberdeen University in 1904, and for a number of years served as a surgeon in the mercantile marine. At the beginning of the war his ship was commandeered for transport work, and he volunteered for service with it.

KILLED in action, Surgeon JOHN SCOTT WARD, R.N., whose name appeared in the casualty list of 24th November.

Surgeon Ward was educated in the School of the Royal College of Surgeons, Edinburgh, and took the Scottish Triple Qualification in 1907. He entered the Royal Navy as a surgeon in 1910.

KILLED in action, Captain I. A. MURRAY-MITCHELL CLARKE, R.A.M.C., on 16th November, aged 23.

Captain Clarke was educated at Edinburgh University, where he graduated as M.B. and Ch.B. in 1915, and immediately after took a temporary commission in the R.A.M.C.

KILLED in action, Captain IAN MACDONALD BROWN, R.A.M.C., on 15th November, aged 28.

Captain Brown, after a year's study in medicine at the University of Edinburgh, entered the London Hospital and took the diplomas of M.R.C.S., L.R.C.P. in 1914. He acted as surgeon, first to the New Zealand Division, and subsequently to the 190th Brigade, R.F.A.

KILLED in action, Lieutenant GEORGE WATSON GUTHRIE, R.A.M.C., on 13th November.

Lieutenant Guthrie was educated at Edinburgh University, where he graduated M.B. and Ch.B. in 1900. He was for a time in practice at Tunbridge Wells, but was recently living at Lima, Peru.

DIED on service, Lieutenant-Colonel HAROLD KNOWLES BEAN, A.M.C., on board the hospital ship *Kanowna*, on 25th September, aged 59.

Lieutenant-Colonel Bean was educated at Edinburgh University, where he graduated M.B. and M.D. Prior to the war he practised in Wallsend, New South Wales.

MEDICAL STUDENTS.

SECOND-LIEUTENANT S. G. M'CLELLAND, King's Own Scottish Borderers, reported missing at Loos on 25th September 1915, now presumed killed on that date.

Second-Lieutenant M'Clelland was a medical student at Glasgow University when he got a commission on 16th December 1914.

DIED of wounds received in action on 23rd July, Sergeant JOHN ALEXANDER MACCOMBIE, 4th Gordons, aged 21.

Sergeant MacCombie entered Aberdeen University in the winter of 1913 as a medical student, and at the outbreak of war had completed his first professional examination.

KILLED in action, Private GILBERT PIRIE, 4th Cameron Highlanders, in August last, aged 21.

Private Pirie was a medical student at Aberdeen University in 1914-15.

DIED on service at Aldershot, Private DAVID GEORGE MELROSE WATT, R.A.M.C., on 26th April 1916, aged 19.

Private Watt was a medical student at the University of Aberdeen.

DIED of wounds on 16th November, Second-Lieutenant RICHARD FORSYTH M'GIBBON, Highland Light Infantry, aged 21.

Second-Lieutenant M'Gibbon was a medical student at Glasgow University before the war broke out. He got his commission on 5th April 1915.

DIED of wounds, Second-Lieutenant A. E. BRANDER, Argyll and Sutherland Highlanders, on 15th November, aged 21.

Second-Lieutenant Brander was educated at Glasgow University, where he was a dental student until he got a commission in August 1915.

KILLED in action, Lieutenant PATRICK JOSEPH M'CUSKER, Royal Dublin Fusiliers, on 13th-14th November.

Lieutenant M'Cusker was a medical student at Glasgow University till he got his commission.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.—At a meeting of the College, held on 20th December, Mr. D. S. Puttanna, L.R.C.S.E., India, having passed the requisite examinations, was admitted a Fellow.

ERRATUM.—In last month's number of the *Journal*, Vol. XVII. p. 450, the date of publication of Sir James Mackenzie's *Principles of Diagnosis and Treatment in Heart Affections* should read 1916, not 1913.

ON THE CAUSATION OF THE NAEGELE AND ROBERT PELVES, WITH A DESCRIPTION OF ONE HITHER-TO UNDESCRIBED SPECIMEN OF EACH.

By D. BERRY HART, M.D., F.R.C.P.E.,
Lecturer on Midwifery and Diseases of Women, Surgeons' Hall, Edinburgh.

"It is surely, nowadays, a work of supererogation to say one word in answer to those who would wish to set aside all attempts to introduce into the philosophy of the human frame the trite laws of mechanical action.

"Our knowledge of physiology, as it now makes daily progress, ever tends to reduce within narrower and still narrower limits the phenomena or functions which are peculiarly designated vital, a term which is equally useful to screen our ignorance, to excuse our want of ability and zeal in probing Nature's secrets, or to indicate our arrival at ultimate laws, beyond which even the dreams of philosophers cannot anticipate the possibility of reaching."—(Matthews Duncan in 1865.)

"No kind of causality based upon the constellations of single physical and chemical acts can account for organic and individual development; this development is not to be explained by any hypothesis about configuration of physical and chemical agents. Therefore there must be something else which is to be regarded as the sufficient reason of individual form production."—(Driesch, Gifford Lectures, 1907, p. 142.)

The Naegele and Robert pelves are among the rarest and most striking forms of pelvic deformity, and, indeed, of the latter probably not many more than a dozen are known to exist. I have one good specimen of Naegele's pelvis in my museum, and through the kindness of Dr. Barbour Simpson have been able to examine one specimen—a very fine one—of Robert's pelvis, which has long been in the Edinburgh Obstetrical Museum, and, indeed, dates back to Sir James Simpson's time, if not further.

The causation of these striking deformities has hitherto been much disputed, and the general trend of opinion has been towards a purely mechanical explanation acting in the adult, viz. downward body-pressure and upward leg-resistance acting on one anchylosed sacro-iliac joint in the case of the Naegele form, or

on both anchylosed sacro-iliac joints in the Robert form; in each case previous inflammation of the sacro-iliac joint is supposed to have existed.

While this view has been long held, and is, indeed, still tenaciously advocated in the comprehensive monograph of Breus and Kolisko, its success has been greatly shaken by the contributions of Fehling (1876), Arthur Thomson (1899), and others as to the cause of the special shape of the normal foetal male and female pelvis, and also by more recent advances in the intimate knowledge of fertilisation and of the remarkable contribution to the mechanism of evolution known as Mendelism.

I have, therefore, been stimulated to raise once more the question of the real causation of these rare deformities in the light of modern knowledge.

The subject may be conveniently considered under the following heads:—

- I. The Anatomy of the Naegele and Pseudo-Naegele Pelves.
- II. The Anatomy of the Robert and Pseudo-Robert Pelves.
- III. The Post-Natal Causation of the True Naegele and Robert Pelves and of the Pseudo Varieties: The Mechanical Standpoint.
- IV. An Intrinsic and Ante-Natal Theory of the True Naegele and Robert Pelves.

I. THE ANATOMY OF THE NAEGELE AND PSEUDO-NAEGELE PELVES.

The Naegele Pelvis.—This pelvis is too well known to need detailed description. A full and comprehensive account is given in Breus and Kolisko, and its chief features are well seen in my own specimen (Figs. 1 and 2).

The first striking feature is the anchylosis of one sacro-iliac joint without any evidence either on the superficies of the joint or in the blended surfaces of previous inflammatory action; the stunting or complete absence of one ala sacri, and the smaller size of the corresponding innominate bone; the straightening out of the linea terminalis on the affected side, *i.e.* it is straightened out, and has not the concavity of that part of the normal brim. The external surface of the altered sacro-iliac joint is smooth and sometimes eburnated.

Thus the brim is oblique and the lumbar portion of the spinal column more or less scoliotic towards the affected side. The

altered ala sacri is higher in the pelvis than the sound one. The flat part of the iliac bone on the affected side stands higher.



FIG. 1.—Tracing of the Brim of a Naegele Pelvis; history unknown. The appearance over the left sacro-iliac joint region is a mere superficial crack.

The os innominatum on the affected side is smaller than on the sound one, and stands higher. The symphysis pubis joint lies to the sound side beyond the middle line, and the joint surfaces



FIG. 2.—Tracing of Outlet of Naegele Pelvis. In the middle line from below up are seen; posterior surface of lower aspect of sacrum, promontory to left. Note straightness of left side of pubic arch.

are everted. These are the main points, but there are many minor ones which need not be detailed, as they are secondary to those given, and not of causal significance. The obliquity of the outlet may be noted (Fig. 2).

PLATE I.



Brim and Pelvic Region of a Rigid Pelvis.

Diagnosis.—This is quite easy in the bony pelvis, but more difficult in the living woman. Apart from the limp in walking and the inequality in level of the anterior superior spines, the following measurements are necessary, and may be illustrated by those used by Naegele:—(1) From the tuber ischii on one side to the posterior superior process of the other (normal, $17\frac{1}{2}$ cm.); (2) from the anterior superior spine of one hip bone to the posterior superior spinous process of the other (21.23 cm.); (3) from the spinous process of the last lumbar vertebra to the anterior spinous processes of both hip bones (18 cm.); (4) from the great trochanter of the one side to the posterior superior spinous process of the other ($22\frac{1}{4}$ cm.); (5) from the middle of the lower symphysis edge to the posterior superior spinous processes on each side ($17\frac{1}{4}$ cm.).

A difference of 1 cm. to $1\frac{1}{2}$ cm. in bilateral measurements is in favour of obliquity (see von Winckel, II. 3, 1955).

These measurements are, however, difficult to make accurately. On internal examination the linea terminalis is more easily reached on the affected side, and suprapubic palpation will confirm this. This part of the subject is well discussed by Schauta (see Müller's *Handbuch*, II. 328).

Naegele's monograph was published in 1839, describing his two specimens of 1805, along with others, both male and female, to the number of thirty-seven.

The Pseudo-Naegele or Atypical Naegele Pelvis.—There exist pelves with evident traces of ostitis and also synostosis of one sacro-iliac joint. Breus and Kolisko figure several specimens, but I have not as yet personally seen one (*op. cit.*, II. 139, *et passim*). This pelvis simulates the true Naegele one, but the traces of inflammation on the joint and ilium and on the ala sacri are evident in contrast to the absence of such in the true Naegele. The causation of this form is evidently inflammatory; that is, there is ostitis and synostosis of one sacro-iliac joint. The ala sacri may be small or almost normal.

The bearing of these specimens will be discussed under III.

II. THE ANATOMY OF THE ROBERT AND PSEUDO-ROBERT PELVES.

The remarkable pelvis, known as the Robert, was first described by Robert of Karlsruhe in 1842, and is by far the rarest form of deformed pelvis.

It is distinguished by its symmetrical smallness (see Plates I.

and II.), the great reduction in its transverse diameters, and the narrowness of the pubic arch. Its most characteristic feature is the ankylosis of both sacro-iliac joints, with absence or deficient development of both alæ sacri. Its relation to the Naegele pelvis is evident, one joint being ankylosed in the Naegele form and both in the Robert.

The projection of the iliac bones above the promontory of the sacrum is greater than normal, so that the latter appears sunk into the upper pelvic strait. The sacrum is small, and the anterior surface flattened longitudinally and transversely. The sacral foramina are small, and the ischial spines close to the lateral aspects of the sacrum.

A curious fact may be noted in the sacrum, viz. that the front aspect of the last sacral vertebra alone is concave from side to side and also vertically. This is present in the specimen figured here, and is also mentioned by others. The linea terminalis is almost straight in the iliac region, and the whole brim much like a rectangular parallelogram, with the iliac boundaries longer than the pubic and sacral. Sometimes high assimilation of the promontory may be present (Breus and Kolisko, I. 112-117).

The Robert pelvis has been found in the foetus by Hohl and others, and a true Naegele is said to have been described by the same author and others, but Breus and Kolisko deny the significance of these observations (II. 219, 220, *op. cit.*).

Hohl's foetal specimen is figured in the second edition of his *Midwifery Text-Book*, but I have only seen the reproduction in Müller's *Handbuch*, Schauta's article, Fig. 48.

The *pseudo-Robert pelvis* has sacro-iliac synostosis of both sacro-iliac joints, but not the characteristic narrowing of the transverses of the true Robert form. Thus in a specimen figured by Breus and Kolisko the c.v. is 11 cm.; transverse major, 13 cm.; transverse anterior, 11·7 cm.; both obliques, 12·5 cm. In the true Robert the conjugate may be 9·9 cm. to 12 cm., and the transverse 7·2 to 10 cm. The alæ sacri are not stunted in the pseudo-form (Plate II.).

III. THE POST-NATAL CAUSATION OF THE TRUE NAEGELE AND ROBERT PELVES AND OF THE PSEUDO VARIETIES FROM THE MECHANICAL STANDPOINT.

As a preliminary we must take up the question of the causation of the shape of the true and false pelvis in the normal adult

PLATE II.



Pubic and Outlet Region of a Robert Pelvis.



Pelvis with Bilateral Synostosis of Iliosacral Joints. Atypical or Pseudostern of Robert Pelvis. Abundant excessive over-ossification in the region of the ankylosed joints, and on the ventral aspect of the sacrum with complete osseous union of the sacrum, due to severe tubercle osteitis. (Brous and Kolisko.)

female. Matthews Duncan, Schroeder, and Veit were the pioneers in this inquiry, and we are greatly indebted to them, especially to Duncan, for laying the foundation of the physics of the transmission of body-weight in the upright posture. These observers, however, considered the question in the rather limited aspect of the special shape of the normal female brim, this being the part of the pelvis easily shown in a diagram, and they failed to see that what applied to the mechanical causation of the shape of the female pelvis must have equal force in regard to that of the male. Duncan started with the shape of the brim of the full-time infant and figured it as an oval, the conjugate being longer than the transverse. The reason of this assumption is evident. As the result of the body-weight acting down in the vertical direction and the leg resistance up, the pelvis of the female walking child with the lumbar curve developed was believed to become narrowed in the brim-conjugate and widened in the transverse.

Duncan attached great influence to the normal sacro-iliac joints in favouring this change in brim shape, as the following quotation shows:—

“ . . . As modern research proceeds, the importance of the joints becomes more and more evident. They are now regarded as contributing not merely to the safety of the structure of the body, by their action along with numerous other joints, in preventing mechanical injury from various forms of violence; to the prevention of shock to the nervous system from similar causes; to the expansion of the pelvic passage in parturition; but also to the development of the healthy pelvis into its perfect form ” (*Researches in Obstetrics*, p. 119).

The full-time foetal pelvis as figured by Duncan cannot, however, be accepted as normal, inasmuch as it has a high assimilation of the promontory, *i.e.* is a pelvis which in the adult will be what is known as the male type, with six vertebrae in the sacrum, the promontory high up and approaching the level of the iliac crests, and with the c.v. above normal, and an outlet narrowed, especially in the ischial transverse and pubic arch. It is possible, however, that where six vertebrae are not present the high assimilation may disappear from an increase in the growth of the ilium, but this point has not been sufficiently investigated.

If Duncan's mechanism applies to the female it must also hold good in the male. The male pelvis, however, is the opposite of the female, as it has a narrow cordate brim, pelvic walls sloping in, a narrow pubic arch, and also a narrower sacro-sciatic notch.

Duncan, therefore, started with an abnormal pelvis in the child, and did not sufficiently look into the subject of the nature of the foetal pelvis in the male and female during gestation. Fehling of Strasburg investigated a series of foetal pelves, and showed that in them there were already sexual differences, and that after the third month of gestation a female or male pelvis could be diagnosed as such. Arthur Thomson of Oxford confirmed and extended this, and showed that the lateral aspects of foetal pelves as to their sacro-sciatic notches already differed, that in the female foetal pelvis being wide, while the male foetal pelvis has a narrower notch, as we find in the adult.

Duncan's view of the cause of shape of the female adult pelvis breaks down on analysis, but it contains several good points and has been of great historic value.

We must recognise, therefore, that the shape of the normal male or female pelvis is due to an intrinsic power of growth connected with the sex, and that this cannot be ignored. Duncan considered the anchylosis of the one sacro-iliac joint in the true Naegele as having a developmental cause, and as interfering, owing to the absence of the joint, with the modelling of the true pelvis under body-weight and leg-resistance. The sacro-iliac synostosis hindered the development of the proper curvature of the linea terminalis and the rest of the innominate bone on one or both sides, giving the characteristic shapes we know to exist in such cases.

On the theory of disturbed poise in walking, due to the synostosis, John Wood and G. E. Herman have studied the question from a mathematical standpoint, but this seems to me superfluous, although in some respects excellent. Other investigators, as described in Breus and Kolisko (II. 182), consider an ostitis, followed by synostosis of the one sacro-iliac joint in the Naegele pelvis, and of both in the Robert form, the primary cause in the lesion, and appeal to the pseudo-forms for evidence. There is, however, no trace of inflammation in the true forms, and this cannot be got over (see discussion in Breus and Kolisko, II. 282)

The cause of the pseudo-Naegele and pseudo-Robert is undoubtedly an ostitis followed by synostosis, but in the pseudo-Robert, at any rate, the alæ sacri are not diminished in size. These theories of the causation of the true Naegele and true Robert, therefore, break down under strict analysis.

We have now to bring forward an explanation of the conditions in these pelves, based on certain aspects of Mendelism, and attempt

to show that certain maturation changes prior to or at fertilisation are the real causal factors in such forms.

IV. AN INTRINSIC AND ANTE-NATAL THEORY OF THE CAUSATION OF THE TRUE NAEGELE AND ROBERT PELVES: THE SIGNIFICANCE OF THE PSEUDO FORMS.

*The Features in the Naegele and Robert Pelves to be Explained are as follows:—*1. The diminution in size of the alæ sacri and innominate bones.

2. The sacro-iliac synostosis.

The clue to these changes in the pelvis under consideration lies (*a*) in some aspects of Mendelism; (*b*) in an extension of Weismann's views on the relation of the germ-plasma to adult structures or organs; (*c*) in the proper interpretation of the maturation of the germ- and sperm-cells prior to fertilisation.

These we must now consider—

(*a*) What facts did Mendel establish? He demonstrated that plants and animals may be regarded as made up of autonomous unit characters, which in ordinary transmission do not blend but are sifted out in probability ratios, and are passed on unaltered as such. Unit characters cannot be "corrected," but turn up in transmission as they were. Eugenics, the aim of which is an improvement by artificial selection, *i.e.* selective mating, is thus sorely handicapped, as blending or correction of less satisfactory "organs" does not happen in transmission.

Mendel also established, by his plant-crossings with certain contrasted and recognisable features on each side, that the contrasted qualities were, when summed up in several self-fertilised generations, distributed in a probability ratio according to the number of contrasted qualities selected. This was a fact of prime importance. Previous experimenters were in despair, as their results seemed chaotic, and they gave imperfect explanations, as can be seen from the work of Darwin and others. In fact, they left the question unsettled. Mendel, by pushing his crossing experiments through several generations, established the facts we have just stated. An "organ" such as the alæ sacri has several unit characters—for size, bone substance, and cartilages, probably for vessels, etc. When these are all concentrated in this "organ" we get a normal wing of the sacrum.

The sacrum and pelvis are specially well suited for the demonstration of autonomous unit characters. The ossific centres

and joints in an early sacrum and pelvis demonstrate these, and, as we shall see, they behave in certain results of transmission as autonomous unit characters. We find, for instance, in certain specimens the loss of the rib or transverse process elements of the ala sacri as definitely as if a block were lost in a child's picture of an animal, because the block with part of the horse's tail had been lost.

The theories of dominance and recession are only a hindrance to the proper understanding of Mendelism, and the sooner they are abandoned the greater will be the progress of Mendel's great discovery.

We must note, however, that Mendel's crossings established a very curious fact, as yet not understood, viz. that in his crossings in plants, for instance, with one contrasted character on each side, to take the simplest instance, one of the selected unit characters was alone represented in F' of the plant soma, the other being absent. When the contrasted characters are summed up as to their expression, in several generations, we get a probability result. It is mainly on this fact of single expression in F' of one contrasted character that the wild theories of dominance and recession are based. They play no part in the subject we are now considering.

2. We must extend Mendel's conception of autonomous unit characters (in the adult) to the causal structures in the chromosomes — Weismann's determinants. These are protoplasmic electrons, also autonomous, and in the chromosomes. They obey the attractions, repulsions, and ejections of the whirl of ordinary matter (see author's paper, *Edin. Med. Journ.*, 1913-14), and in this way we get the mitotic changes of chromosome divisions — transverse, longitudinal, united, and circulatory. Thus we get in the last state a distribution of determinants by a probability law giving continuous variations, while in the ejections at maturation (*vide* 3) we have discontinuous variations, some of which when large enough give de Vries' mutations (see later (3)). *The ultimate distribution of unit characters is due to these germ-plasma or chromatin variations.* Thus the autonomous varying determinants give the ultimate adult results, and, therefore, all systematic measurements of adult "organs," limbs, digits, height, circumferences, in sufficient numbers give some form of frequency polygon. Measurements of a normal female pelvis in its recognised diameters give, when summed up, such a polygon.

3. To van Beneden we owe the great descriptive fact, that prior to fertilisation half of the chromosomes of the sperm- and

germ-cells are thrown off and gametes formed. These are the actual fertilising structures, and each has only half of the original chromosomes, so that their union brings back the original number in the zygote (fertilised ovum). The ejected chromosomes are probably ancestral; those left, the more immediate ones of the species. In the ancestral half there may, however, be immediate ones, and in the immediate ones, some ancestral, and thus in the latter case we may get atavistic phenomena.

These changes in the germ-plasma are the real causes of variation; the results in the soma are sequent.

The ejection phenomena (maturation) give rise to losses of determinants, and thus, as I hope to show in another communication, almost every organ or part of an organ may not be represented in the adult and otherwise normal body.

I now go on to consider the Naegele and Robert pelves in the light of these statements, and to show that in the Naegele pelvis there has been an ejection at fertilisation of the size factor in whole or part of the one ala sacri and innominate bone, and in the Robert form, an ejection of the size factor, in part, of both alae sacri and innominate bones. I may remark here, again, that in the ala sacri and innominate bones the unit character determinant is not single but a combination of many probably, viz. for size, substance, vessels, and so on.

The cause of these deformities is therefore not an ostitis involving the sacro-iliac joints, but an ante-natal or rather ante-impregnation phenomenon. Naegele, who considered the real cause of the deformity in the pelvis associated with his name was right when he claimed a developmental cause for it, and he thus showed an insight into its real cause which, I have no doubt will be ultimately justified.

A crucial point now arises, however—one on which the validity of the explanations I have already given must to some extent depend—viz.: How is the sacro-iliac synostosis in these cases to be explained; if not by inflammation, what causes it? This query I now attempt to answer.

It has been already pointed out that in an individual, some unit character may be lost, such as the corpus callosum, a certain bone, a segment of bone, certain definite muscles, and so on. A very interesting example of such an exact loss is brachydactyly, where the hands and feet are short and stumpy owing, in the case of the hands, to an absence of the mid-phalanx, the fingers having thus externally only two phalanges. Skiagrams, however,

show that there is a nodule of cartilage representing this lost phalanx, and *that it is anchylosed to the proximal normal phalanx* (H. Drinkwater). We thus see here that the lost phalanx has its basis substance or part of it not thrown off but anchylosed to the proximal normal phalanx.

This may be further illustrated in the case of the normal spine and pelvis. We have in them certain anchylosed segments or unit characters, viz. in the sacrum, coccyx, innominate bones. Finally, we note the anchylosis of the odontoid process and of the basis cranii.

All these are instances of vertebral segments or unit characters where losses have occurred.

The *sacrum* is made up of five reduced sacral vertebræ where certain portions have been lost, viz. parts of the spinous and transverse processes and of the bodies and joints, the reduction being greater as we pass to the coccyx.

There is anchylosis where the three elements of the innominate bones meet in the cotyloid cavity, and here a fourth element in the formation of the cotyloid cavity has been lost, sometimes represented in the dog.

The *first cervical vertebra* has a reduction in its elements, and therefore its reduced body is anchylosed to the second cervical vertebra as the odontoid process.

On the other hand, the segments or vertebræ of the cervical, thoracic, lumbar regions are not reduced, and bones and joints therefore remain unanchylosed.

The basis cranii of the skull may be viewed in the same light. Thus, where anchylosis takes place in the spine, unit characters have been reduced or lost, this loss taking place in the ejection of the polar bodies at maturation of the sperm- and germ-cells.

Duncan's and Driesch's views as to the mechanistic and vitalistic theories of function and form have been quoted at the head of this paper. Without being denominated vitalism or entelechy, it is evident that in normal pelvic form, and in that of the Naegele and Robert pelves, there is some form-shaping power, mainly ante-natal, call it what one may, which mechanical pressure or chemico-physical action is unable to explain.

An accurate observer has remarked that "the idea of entelechy developed by Driesch in his Gifford Lecture is of the most intense interest; but it must be allowed that the conception is almost mystical" (R. Assheton, *Growth in Length*, p. 91). Such a conception, however, enables one to keep an open mind free from the

narrowing power of accepted mechanical views. It is often the complacent and present status of opinion that hinders progress.

SUMMARY.

The true Naegele and Robert pelves have not had a previous ostitis with resulting ankylosis in the region of the sacro-iliac joints, followed by disturbed weight transmission.

The pseudo-Naegele and pseudo-Robert pelves have had a previous ostitis in these regions, and there the synostosis and atrophy are the result of this.

The forms of the Naegele and Robert pelves are the result of polar losses of the size elements of the ala sacri and innominate bones, due to maturation of the sperm- and germ-cells. In these, a loss of ala sacri and innominate determinants has occurred, a great rarity, more often a unilateral loss (Naegele) than a bilateral one (Robert).

The sacro-iliac ankylosis is due to the fact that by such losses (bony elements and joint elements) the part remaining, imperfectly developing, becomes ankylosed.

As this is a germ-plasma change, and multiplication of the reduced elements occurs, it may be transmitted.

I am again indebted to Professor Robinson for the tracings.

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CLINICAL STUDIES. XII.—THE PROGNOSIS IN DISSEMINATED SCLEROSIS; DURATION IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

By BYROM BRAMWELL, M.D., F.R.C.P.E., LL.D., F.R.S.E.; Consulting Physician, Royal Infirmary, Edinburgh; Physician, Chalmers Hospital, Edinburgh.

IN the great majority of cases disseminated sclerosis, sooner or later, causes death; consequently the ultimate prognosis is extremely unfavourable.

The duration of the disease varies greatly in different cases. The course is usually slow and chronic—the disease may last for thirty or more years before the fatal termination is reached. In rare cases the disease pursues a rapid course. In a few rare and exceptional cases the disease seems to be permanently arrested, and a cure, or what is, practically speaking, a cure, takes place.

In some cases the symptoms, once they are developed, pursue a progressive course from bad to worse; but in many cases the downward progress is from time to time interrupted by periods of improvement or complete remission of the symptoms. In some cases the symptoms (giddiness, numbness, diplopia, inco-ordination, loss of power, dimness of vision, nystagmus, volitional tremor, speech affection, etc.) entirely disappear, or almost entirely disappear, for a time. These periods of improvement and remission are very deceptive, for they may lead one to give a favourable prognosis, and, if any special plan of treatment is adopted, to attribute the amelioration to that treatment. Unfortunately, experience shows that, in the great majority of cases of this kind, the improvement is merely temporary. Everyone who has had much experience of disseminated sclerosis knows that although the patients often improve, and, in some instances, apparently for a time get quite well, it is only in very rare instances that the improvement is lasting. The great majority of cases sooner or later relapse. In very rare cases the improvement is so marked (the symptoms completely disappearing) and so prolonged as to warrant the belief that a permanent arrest or cure has taken place; and it seems only reasonable to suppose that in a disease like disseminated sclerosis, in which the symptoms may entirely disappear for a time (for several months or years), permanent arrest and a cure would occasionally occur. The wonder is that permanent arrest and cure do not more frequently take place.

In some of the rare cases in which the symptoms completely disappear and an (? permanent) arrest of the disease seems to take place, optic atrophy or the Babinski sign remains; but these conditions are to be regarded as results rather than active manifestations of the disease.

In common with many authorities I have for many years believed and taught that the patches of sclerosis, which are the pathological substratum of disseminated sclerosis, are due to the irritation produced by some form of toxin carried to, and distributed through, the nervous tissues by the blood-vessels. The recurrence from time to time of the symptoms after periods of improvement and remission is very suggestive of repeated intoxications. If disseminated sclerosis is due to a toxin, the toxin, whatever it is, is probably produced within the body. It seems much more difficult to suppose that fresh doses of the toxin are introduced again and again into the body from without during a long period of years.

Now, if the exacerbations and relapses in disseminated sclerosis are due to recurring intoxications, it is not unreasonable to suppose that, in some cases, the development of the toxin from within, or the absorption of the toxin from without, may cease, and that a permanent arrest and cure may occur.

With the object of trying to determine the duration of the disease, and so arriving at one of the data for a satisfactory prognosis, I have carefully analysed the results in 200 of the cases which have come under my observation in hospital and private practice.

RESULTS OF TREATMENT IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

So far as I know, there are no detailed and definite statistics showing the duration and results of treatment in any considerable number of cases of disseminated sclerosis. I have consequently been at great pains to follow up my cases and to ascertain the duration of the disease and the present condition of the patients. In 200 cases, which I have recently analysed, the results up to the present date (October 1916) are as follows:—106 of the 200 cases have died; 64 cases are known to be still alive; and in 30 cases the result is not known. Of the 64 cases which are known to be still alive, 42 are much worse, 12 are *in statu quo*, 7 are greatly improved, and 3 quite well (See Table I.)

TABLE I.—SHOWING THE RESULTS IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

Died	.	.	.	.	.	.	106 cases
Still alive—Worse	.	.	.	.	.	42 cases	} 64 „
<i>In statu quo</i>	.	.	.	.	.	12 „	
Greatly improved	.	.	.	.	.	7 „	
Quite well	.	.	.	.	.	3 „	
Not known	.	.	.	.	.	.	30 „
Total cases							<u>200</u>

The Total Duration of the Disease Since the Commencement up to the Present Date (October 1916).—This was definitely ascertained in 170 cases; the average duration of the disease in these 170 (fatal and non-fatal) cases is, up to the present date, 12 years and 1 month. In one case the duration of the disease was 37 years, and in no less than 14 cases the disease has lasted for more than 25 years. (See Table II.)

TABLE II.—SHOWING THE TOTAL DURATION IN ONE HUNDRED AND SEVENTY CASES OF DISSEMINATED SCLEROSIS IN WHICH THE RESULT WAS KNOWN IN OCTOBER 1916.

1/2 year	.	.	1 case	} 32 cases	Brought forward	140	} 16 cases	
1 "	.	.	2 cases		20 years	.		5 cases
2 years	.	.	6 "		21 "	.		4 "
3 "	.	.	11 "		22 "	.		3 "
4 "	.	.	12 "	} 41 "	23 "	.	4 "	
5 "	.	.	7 "		24 "	.	...
6 "	.	.	7 "		25 "	.	2 "	
7 "	.	.	9 "		26 "	.	3 "	
8 "	.	.	10 "	} 42 "	27 "	.	1 case	
9 "	.	.	8 "		28 "	.	...
10 "	.	.	11 "		29 "	.	1 "	
11 "	.	.	10 "		30 "	.	3 cases	
12 "	.	.	5 "	} 25 "	31 "	.	...
13 "	.	.	9 "		32 "	.	1 case	
14 "	.	.	7 "		33 "	.	...
15 "	.	.	7 "		34 "	.	1 "	
16 "	.	.	4 "	} 2 "	35 "	.	1 "	
17 "	.	.	3 "		36 "	.	...
18 "	.	.	8 "		37 "	.	1 "	
19 "	.	.	3 "		Total cases			<u>170</u>
Carry forward	.		140					

The Total Duration in 106 Fatal Cases of Disseminated Sclerosis.—In the 106 cases in which the disease proved fatal the average duration was 10 years and 8 months; the shortest duration was 7 months, and the longest duration was 37 years.

The exact duration in each of the 106 fatal cases is shown in the following table:—

TABLE III.—SHOWING THE EXACT DURATION IN ONE HUNDRED AND SIX FATAL CASES OF DISSEMINATED SCLEROSIS.

7 months	1 case	} 23 cases	Brought forward	78	
1 year	2 cases		15 years	5 cases	} 14 cases
2 years	4 „		16 „	2 „	
3 „	7 „		17 „	1 case	
4 „	9 „	} 31 „	18 „	5 cases	} 8 „
5 „	6 „		19 „	1 case	
6 „	7 „		20 „	4 cases	
7 „	7 „		21 „	2 „	
8 „	8 „	} 24 „	23 „	2 „	} 4 „
9 „	3 „		25 „	1 case	
10 „	8 „		26 „	2 cases	
11 „	5 „		27 „	1 case	
12 „	4 „	} 1 case	34 „	1 „	1 case
13 „	4 „		37 „	1 „	1 „
14 „	3 „				
Carry forward	78		Total cases	106	

From this table it will be seen that in 23, or 21·6 per cent., of the 106 fatal cases, the disease terminated in less than 5 years; in 54, or 50·9 per cent., of the 106 fatal cases in less than 10 years; in 78, or 73·5 per cent., of the 106 fatal cases in less than 15 years; and in 92, or 86·7 per cent., of the fatal cases in less than 20 years.

The following are brief clinical records of two cases in which a permanent cure seems to have taken place, and of two cases in which the disease lasted respectively for 37 and 34 years:—

CASE I. *Disseminated Sclerosis; Recovery*.—Female, aged 49, seen 23rd June 1902.

Complaints.—Numbness and weakness in left hand and arm.

Previous History.—In 1891 (11 years previously), after influenza and rheumatism, temporary numbness and loss of power in the left hand developed. Several attacks of the same sort have occurred since. In 1892 numbness and loss of power developed in the feet and legs. The patient at this date consulted Sir Christopher Nixon of Dublin, who diagnosed disseminated sclerosis, who on 28th June 1902 wrote me: “My recollection of Mrs. ———’s case is that it was one of multiple cerebro-spinal sclerosis, and I am surprised to hear that she got at any time completely rid of her symptoms. She had, at the time I saw her, spastic gait, intention tremor, slight degree of nystagmus, and some attacks of giddiness. I saw her, I think, twice.”

In October 1893 the patient consulted Mr. (now Sir) George Berry on account of loss of vision, first in one eye and then in the other. On 24th June 1902 Mr. George Berry wrote me: "On 30th October 1893 the patient had $V = \frac{20}{100}$ left eye; no ophthalmoscopic changes; no pain on pressing the eye back into orbit. My diagnosis was *retrobulbar neuritis* (peripheral and probably rheumatic)."

State on 23rd June 1902.—Knee-jerks markedly exaggerated, particularly the left; Babinski sign on the left side; some (slight) inco-ordination of the left hand, very slight inco-ordination of the right hand on performing the finger-nose test; no nystagmus, volitional tremor, or speech affection (the articulation had been previously affected); no difficulty in urination; no ankle-clonus; no defects of memory.

Diagnosis.—Disseminated sclerosis, confirmed by the statements of Sir Christopher Nixon and Sir George Berry quoted above.

Subsequent Progress of the Case.—On 24th June 1904 the patient's doctor wrote me: "She is quite well, and has been quite well since you saw her in June 1902; the knee-jerks are still markedly exaggerated; the Babinski sign was not obtained on 23rd June." And again, on 16th January 1905: "The patient remains quite well."

On 13th September 1916 the patient wrote me saying that she continued to feel quite well.

CASE II. *Atypical Disseminated Sclerosis; Apparent Recovery.*—Female, aged 26, was seen on 25th July 1899.

History.—The patient, who is a somewhat nervous girl, enjoyed good health until three and a half years ago (*January 1896*); she then gradually lost the sight of the left eye. She consulted Dr. George Mackay, who found optic neuritis present in the left eye, with marked impairment of vision. Under treatment the optic neuritis gradually disappeared and vision was to some extent regained. In August 1898 she lost vision in the right eye. On 30th August 1898 optic neuritis was found to be present in the right eye. Under treatment this gradually improved. Her medical man (Dr. Edward Carmichael) has kindly sent me the following report from Dr. George Mackay on the condition of the optic discs and vision: "Miss C. is hypermetropic and astigmatic. In the beginning of January 1896 she began to have pain above the left eyebrow and in the temple."

"On 15th January 1896 she first came to me with left optic neuritis, very vivid hyperæmia of the disc substance, but not much tortuosity of veins nor much swelling of the disc. Some tenderness on backward pressure of the left globe."

RV with glasses = $\frac{6}{9}$ good field.

LV ,, = hand movements only in the outer part of the field.

She was ordered eye rest, leeches to the temple, and sod. salicyl. Later the temple was blistered, and pot. iod. with hyd. perchlor. given.

"By 11th February LV had returned to $\frac{6}{36}$.

"By 7th March exudation gone, disc pale and partially atrophied, but good field for hand movements.

"She returned to work, and did not consult me again until 29th October 1897, when I found vision unchanged. She is naturally high-coloured, and her right disc always looked hyperæmic, but showed no sign of inflammation until 30th August 1898, when, in my absence, Dr. Matthew (my assistant) found the right disc hazy, but RV still $=\frac{6}{9}$ with difficulty.

"On 15th September I found RV with glasses $=\frac{6}{24}$. No pain nor tenderness. A decided scotoma for colours to the inner side of the point of fixation and across the middle line, and diagnosed a retro-bulbar neuritis. The same kind of treatment was again adopted, but sod. salicyl. pushed more freely, and perspiration encouraged by hot pack.

"By 31st January 1899 RV returned to $\frac{6}{9}$ partly, and by 7th April continued the same, but trace of scotoma for colours still present. Right disc hyperæmic but not obscured by exudation. LV had improved to $\frac{6}{12}$ partly, and she seemed much better in all respects. Complained that her sight became worse on exertion. I have not seen her since, and much regret to get your report of this new development."

A month ago (in June 1899) she was accidentally knocked over in the street. Since then she has complained of numbness and weakness in the legs and unsteadiness and difficulty in walking.

State on 25th July 1899.—Optic atrophy present in the left eye; the right disc seemed normal; the knee-jerks were both markedly exaggerated; slight ankle-clonus and a double extensor response were present on both sides; marked Rombergism; inco-ordination and some volitional tremor in the right hand. The general health was good; there was no giddiness, no headache, no vomiting, no nystagmus, no speech affection, no urinary derangement, no objective disturbance of sensation, no loss of the muscular sense. The hands, feet, and face were cold and blue, especially on exposure to cold; menstruation was regular and natural. There were no signs of congenital or acquired syphilis.

Diagnosis.—I diagnosed the case as one of disseminated sclerosis, and my son (Dr. Edwin Bramwell), who saw the patient with me, agreed with this diagnosis.

Arsenic and nitrate of silver were prescribed.

Subsequent Progress of the Case, 10th June 1902.—Much better. The only thing she now complains of is blueness and coldness of the face, hands, and feet, and sometimes a numb feeling in the hands and feet.

The knee-jerks are still exaggerated ; ankle-clonus is still present, especially in the right foot ; the plantar reflex shows marked extension in the right foot, no toe movement in the left ; slight inco-ordination and some volitional tremor still present in the right hand. Distant vision in the right eye = $\frac{6}{8}$, in the left $\frac{6}{36}$. Near vision with glasses, right = 0·5, left = 0·5 (imperfect). The left disc is still very pale.

26th January 1905.—Patient says that she has been quite well since last seen. Face, hands, and feet still blue and cold ; knee-jerks still exaggerated ; no ankle-clonus ; extensor response present in the right, absent in the left foot ; left disc still markedly paler than the right. The Rombergism, and the inco-ordination and intention tremor in the right hand, which were noted in 1899 and 1902, are no longer present.

On 11th August 1916 the patient wrote: "My health keeps very well. I may state that I have never been off business except with a slight cold since seeing you."

CASE III. *Typical Disseminated Sclerosis of 37 Years' Duration.*—Female, aged 34, was seen on 25th July 1890, and died in February 1913.

History.—The disease commenced, the result, she thinks, of a wetting three weeks before the first symptoms, at the age of 20 (year 1876). The first symptoms were loss of vision in the right eye, and loss of power in the right arm and leg. These symptoms were of temporary duration. During the next ten years she suffered from recurring attacks of powerlessness and loss of feeling in the right side ; they usually lasted for two or three days. For the past year (1889) has been much worse ; suffered from shaking in the arms, especially the right ; some speech difficulty ; some loss of vision, particularly in the right eye ; some difficulty with water and bowels.

Condition on Examination (25th July 1890).—A big, tall, healthy looking woman. Walks in a very ataxic and spastic way (spastic-ataxic paraplegia), the right leg worse than the left ; knee-jerks greatly increased ; double ankle-clonus (double Babinski noted later) ; marked volitional tremor, especially in the right arm ; articulation typical ; some partial optic atrophy ; some difficulty both with bladder and rectum (forcing, occasional dribbling, and marked constipation) ; no nystagmus ; menstruation regular.

Subsequent Progress of the Case.—General health continued good. Difficulty in walking and volitional tremor became more marked ; the patient suffered from giddiness, speech affection, nystagmus, occasional headache, marked difficulty in making water, marked constipation, knee-jerks greatly exaggerated, double ankle-clonus, double Babinski. Died in February 1913, having been bedridden, and practically helpless, for two years.

CASE IV. *Typical Disseminated Sclerosis of 34 Years' Duration.*—Male, aged 24, was seen on 18th March 1894, suffering from typical disseminated sclerosis.

History.—At the age of 2 had an attack of scarlet fever and bronchitis; volitional tremor developed after this and has continued more or less since. At the age of 18 got very much worse without any apparent cause—the volitional tremor became extremely marked, speech became affected, and there was difficulty with the water.

Condition on Examination.—Walking difficult (spastic and ataxic paraplegia); knee-jerks markedly exaggerated; double ankle-clonus (Babinski detected later); abdominal reflex absent; occasional giddiness; very marked volitional tremor affecting both arms, head, and legs; marked speech affection; expression vacant; more emotional (laughs too easily); occasional pain in the back; occasional difficulty in urination—dribbling and precipitant; bowels very constipated; no nystagmus.

Died in Longmore Hospital, Edinburgh, 6th December 1906. The typical symptoms of disseminated sclerosis had been present since his admission twelve years previously.

DR. PASCAL ROUGON: ZOLA'S STUDY OF A SAVANT.

By J. BARFIELD ADAMS, L.R.C.P., L.R.C.S.,
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THE sequel of a novel is rarely a success. There is the danger of an anticlimax. The puppets, which played the parts of hero and heroine in the first book, often occupy subordinate positions in the second, and in this way disappoint the reader. But the commonest cause of the failure is the inability of the novelist to preserve the identity of his characters while allowing for the effect of the changed times and circumstances under which he presents them to his audience.

If it be difficult to write one sequel, what must it have been for Émile Zola to write nineteen? He had not only to describe with accuracy the mental and physical changes wrought by varying circumstance and by the hand of time upon the actors on his stage, but he had to contend with the alterations in his own mind as years passed by. Zola was twenty-two years writing his Rougon-Macquart series of novels, and who looks at things from the same point of view at the age of fifty-three as he did at thirty-one? But in spite of shifting scenes and different circumstances, whether they rise or fall in the social scale, the master has preserved the identity of his characters. They have,

indeed, changed the cut of their clothes according to the fashion of the day, and health and disease, wealth and poverty, vice and good deeds, and the unconscious influence of their fellows with whom they have come in contact, have left marks graven deeply on both mind and body; but the soldier fighting on the battlefield of Sedan is the same man as he who ploughed the rich land of the Beauce, or worked in the carpenter's shop in Plassans; that wealthy and respected old lady, long past the life limit of the Psalmist, is the same woman as she who sinned and schemed night and day to raise herself and her family in the estimation of the world, and, if need be, she is as ready now to sell her soul for a mess of pottage as she was fifty years ago.

In the case of Pascal Rougon this personal identity is preserved throughout the whole series of novels; he appears in them, I think, more frequently than any other character. In *La Fortune des Rougon*, the first volume, we are introduced to him; we meet him, or we hear of him, in many others; and in the last, which bears his name upon the title-page, he plays the principal rôle.

Zola has the gift of clothing with flesh the creations of his fancy. They are as real to us as our friends and neighbours. Pascal Rougon might have been one of our fellow students. Although his biographer does not actually say so, we know that he was not altogether a favourite with the other men when he was walking the hospitals. His Provençal accent jarred on our sensitive Parisian ears, and his manners seemed to us a little rough. He had a profound contempt for all that was mean or ignoble, and the sarcasm with which he lashed the failings of others was not always in good taste—at least, we did not think so. No, he was not popular. But the few, who were admitted to his friendship, loved him for his honesty and goodness of heart, and admired him for his devotion to work.

His student's career was most distinguished, and the gossip of the Quartier Latin prophesied a brilliant future for him. But to the disappointment of his friends and the joy of his rivals, when he took his degree, he threw to the winds the fortune which was said to be awaiting him in Paris, and returned to his native city.

A year or two later, he invites us to visit him at Plassans. He is waiting for us outside the Hôtel de Provence as the *diligence* rumbles over the stones of the Cours de Sauvaire, the main thoroughfare of the little city. A man in a long black blouse takes our luggage away on a wheelbarrow, and we follow with

Pascal, walking arm in arm just as we used to do in Paris, until we arrive at his house in the new town, where he dwells alone with a single servant to look after his wants. He has not changed a bit. He is as enthusiastic as ever. Long before we had left behind us the great plane trees which border the Cours de Sauvaire, we were listening to his dreams of a science which should conquer suffering and death, for his enthusiasm was not the passing fever of adolescence, but ripened with ripening years.

During the next few days we see something of our old friend's life. We spend hours in his laboratory. He explains to us the researches he is carrying out, and we glance over the rough draft of an article which embodies his discoveries. We see something, too, of his family, especially of his mother, Madame Rougon, a little, dark-complexioned woman, dried up—but not withered—who has a high-pitched voice, and who reminds one of the brown *cigales* which haunt the countryside and make the neighbouring plantations of olives and almond-trees vocal with their strident music. On the whole we are not impressed by our friend's relations, and we wonder how it chanced that he was born into such a tribe.

It is summer time, and we are tanned by the hot sun of Provence as we drive with Pascal in his little gig on his long rounds among distant farms and hamlets, for though it is easy to see that the young doctor is not a great success among the rich, he has a practice, which is more extensive than lucrative, among the poor. It is among the poor, too, that he finds his friends. For example, we never pass the lodge gates of Paradou, a vast, neglected estate a few miles from Plassans, without stopping to gossip with Jeanbernat, the gamekeeper, who is Pascal's constant companion on his geological and botanical excursions. Jeanbernat is a character in his way. He spends his lonely winter nights reading the books of the eighteenth-century philosophers, and as he pours out for us the good wine of Saint-Eutrope, he repeats the sarcasms of the Encyclopædists on things human and divine—sarcasms which lose their polish but not their pungency by being filtered through a gamekeeper's brain.

So the days of our holiday pass by, and when we climb into the *diligence* which is to take us back to work and Paris, we rather envy Pascal his country practice.

After that we gradually drifted apart. We corresponded at first, but, as so often happens in similar circumstances, our letters

became fewer and fewer. Occasionally we hear the name of Pascal Rougon mentioned with respect in scientific circles, or see it at the head of an article in a medical journal, or we chance to meet a mutual acquaintance, and so we hear news of our old friend.

However, twenty-five years after our first visit to Plassans we spend another holiday in the little city. This time we arrive by the railway, and not by a lumbering *diligence*, and Pascal meets us on the platform of the railway station, and not at the door of the Hôtel de Provence. The man has changed. His hair and beard are as white as snow. But he looks solid, in spite of his age, and the expression of his face and the look in his clear eyes are the same as ever. But his dress—his tightly-buttoned frock coat and carefully brushed, wide-brimmed silk hat—we can hardly repress a smile, when we remember the Bohemian tastes of the medical student and the young practitioner.

We find that our friend has moved to an old-fashioned house in the suburbs of Plassans, on the road to Fenouillères, where he lives after the manner of Don Quixote with his niece and his housekeeper. Here he pursued the life of a savant, immersed in his studies and his experiments. Being an old bachelor, gossip naturally interested herself in his affairs. One heard of a certain lady patient, to whom he never told his love. He had not even dared to kiss the tips of her fingers. One hears that tale about every unmarried medical man. Then there was another story about Albine, the niece of Jeanbernat, the gamekeeper at Paradou. She was as fascinating as Circe and as beautiful as Venus. But she was more than thirty years younger than Dr. Rougon. There could be no truth in that story. At the same time, a love affair late in life, if you have never been taken that way before, is as dangerous as measles. From our own observations, however, we should have said that if Pascal Rougon loved any woman, the fair object of his affections was his niece Clotilde, one of the most charming girls it was possible to meet with.

But putting such nonsense aside, it was a pleasant time we spent at Plassans. We talked with Pascal for hours of our student days, for we were both old enough for the memories of long ago to be as clear as those of yesterday. We asked after old friends, and we told each other something of the toil of middle life—something of the plans which had shipwrecked, and a little, for there was very little to tell, of those which had succeeded.

As days passed by and we saw more of our old friend, we

noticed little changes in his character as well as in his person and his dress. He seemed to have mellowed with the flight of time. His sarcasm, which in old days was sometimes coarse and brutal, survived as little more than playful banter, which was only pungent enough to be amusing, and his enthusiasm for science had crystallised into a lively faith in the destiny of the human race made happier and healthier by its own efforts.

This is but a thumb-nail sketch of Zola's finished picture, but it roughly represents what many of us know of other men, with whom we were close friends at college, and whom in after life we meet occasionally.

Pascal Rougon was the second son of a tradesman of Plassans, a sleepy little city in Provence. His father was a commonplace individual, but his mother was a woman of considerable intelligence and of extraordinary tenacity in working out her schemes of ambition. She spent her whole life in endeavouring to raise herself and her family in the social scale, and the morality of any step that she took never troubled her, if only it were successful. She determined that her sons should occupy distinguished positions in the world, and to fit them for such, she spent upon their education every penny that could be spared from her husband's business. After years of self-denial, and after many apprehensions lest her sacrifices had been in vain, Madame Rougon felt herself rewarded by the successful careers of two of her sons, one in the world of politics, the other in that of finance. But Pascal disappointed her. He appeared to be utterly devoid of the family ambition.

Having chosen medicine for his future profession, the young man went to study in Paris, where he greatly distinguished himself, so much so that when he took his degree he was advised to remain in the French capital, where it was certain that wealth and honour awaited him. But the career of a consulting physician, however eminent, had no attraction for Pascal Rougon. He loved science for itself alone, and he stoutly maintained that for a savant the quiet of a country town was preferable to the bustle of the metropolis.

So with his diplomas in his pocket he returned to Plassans. But even there he made no attempt to build up a practice. He was content with the patients that chance brought to his door. He devoted himself with ardour to scientific study, and some of his methods of doing so damaged him very much in the eyes of the *élite* of the city. It leaked out that, in order to continue his

anatomical researches, he had made a private arrangement with the porter of the municipal hospital to supply him occasionally with the unclaimed body of a patient who might die in that institution. Was it not horrible? Would any man of good taste do such a thing?

"I would rather die than be attended by that gentleman," said the lady mayoress one day. "He positively smells of death."

But Pascal did not care. He was only amused at the dull sort of fear with which he inspired his fellow-citizens. The fewer patients he had, the more he was able to devote himself to science. But he made enough to live upon, for his fees being moderate, the poorer classes came to consult him in considerable numbers.

He worked hard at original research, and from time to time he sent an account of his discoveries to the Académie des Sciences at Paris. Plassans was altogether ignorant that this original—this gentleman who "smelt of death"—was a man well known and very much listened to in *le monde savant*. On Sunday evening, when his fellow-townsmen saw him returning from an excursion into the country, with his old clothes covered with dust, a battered vasculum hanging at his back, and a geological hammer sticking out of one of his pockets, they shrugged their shoulders and compared him with the other doctors of the city—Dr. Porquière, for example—men who were always so well groomed, so gallant in their behaviour to the ladies, and whose garments always exhaled a delicious odour of violets.

Madame Rougon was perfectly horrified at the conduct of her son.

"You don't seem to belong to the family," she would say to him. "Your brothers do try to draw some profit from the instruction which we have given them. You, you only make a fool of yourself. You recompense us very badly, us, who have ruined ourselves to bring you up."

"Do not pity yourself so much," Pascal would reply gaily, but with a note of irony in his voice. "I don't want to make you entirely bankrupt. When you are ill, I will attend you for nothing."

"If you went more into the world of fashion," continued Madame Rougon, taking no notice of his banter, "you would get patients in the higher classes of society. Come at any rate and spend a few evenings in my *salon*. There you will make the acquaintance of wealthy and distinguished people, who are all able

to pay you four or five francs a visit. Poor patients will never make you rich."

To please his mother, whom, though he was by no means blind to the moral defects of her character, he always treated with filial respect, Pascal sometimes made his appearance in her drawing-room—her celebrated *salon jaune*—when she held one of her evenings.

Here, to his surprise, the young doctor found he was not so much bored as he expected to be. He was amused to see to what depths of imbecility grown-up people could descend when they figured in society. The retired merchants, the half-pay officers, and the marquises who frequented the *salon jaune*, appeared to Pascal to be specimens of curious animals which he had not had the opportunity of studying before. "With the interest of a naturalist he regarded their faces, fixed in a grimace, in which he sought to discover their occupations and their appetites; he listened to their empty conversation as he might have done if he had been trying to discover sense in the mewing of a cat or the baying of a dog."

Just at this time Pascal was very much occupied with the study of comparative natural history. So, being in his mother's drawing-room, he amused himself by making believe that he had fallen into a menagerie. He imagined a resemblance between each of the grotesque individuals around him and some animal of his acquaintance. That marquis with his spare figure and small and cunning head reminded him of a green grasshopper. A certain bookseller made upon him the impression of a pale and slimy toad. A well-to-do landowner looked like a fat sheep; and a captain, retired upon half-pay, resembled an old dog that had lost its teeth. But he became particularly interested in a certain merchant, a very worthy man and a town councillor. This gentleman was afflicted with a hare-lip—from Zola's description of the defect, one fears that the surgeon who attempted repairs had not been very successful,—round, staring eyes, and a face the general expression of which was at once self-satisfied and astonished, "making him resemble a fat goose which was digesting its food in salutary fear of the cook."

Pascal might find amusement in his mother's drawing-room, but his unsociable behaviour by no means pleased Madame Rougon.

"Why don't you talk to my friends?" she asked, going up to her son, as he sat in one corner of the room apart from the

other guests. "Try and make yourself agreeable. Try and get some patients among these gentlemen."

"I am not a veterinary surgeon," replied Pascal, who was beginning to be tired of the whole affair.

No, Dr. Pascal Rougon was certainly not a success in the good city of Plassans. Even his family turned the cold shoulder upon him. Now, there is no better criterion of a man's success in life than the way in which he is treated by his relations. Let him obtain distinction, and they crowd around him—in fact, they make themselves a perfect nuisance: let him be a failure, or let them think he is one, and they never darken his doors. Life is full of compensations—though we don't always recognise them—and perhaps this is one of the compensations of failure. But putting general considerations aside, it is only too true that Pascal Rougon's friends treated him very coldly. When his cousin, Madame Mouret, was taken ill—the Mourets were well-to-do people; they lived in the Rue de Balande, next door, I believe, to the Sous-Préfecture—Dr. Porquière was called in, and we all know what a mess that eminent physician made of the case. It is true that that disreputable old drunkard Antoine Macquart, Pascal's uncle—the Church, for reasons which it is not necessary to discuss here, did not recognise the relationship—did take advantage of his nephew's good-nature, and sent for him, or allowed him to be sent for, when he was ill. But after his recovery Macquart had not a good word to say for his nephew; on the contrary, he abused him heartily, so much so that his wife, down-trodden as she was, stood up in the young man's defence.

"He attended you without ever asking for a sou," she said, "and he often slipped a five-franc piece into my hand to pay for your soup when we had nothing in the house."

"He!" exclaimed Macquart, angrily. "I should have died under his hands if I had not had a good constitution. He is a doctor of four sous. He has not got a person *comme il faut* among his patients."

One easily understands that Dr. Pascal Rougon was never likely to make a large fortune out of the practice of medicine. But if his income was small his wants were few, and if the water runs in by a four-inch pipe and runs out by the spigot-hole, in time the barrel becomes full. In the course of twelve years or so Pascal had saved a sum of money, the greater part of which he placed in the hands of a notary for investment. He considered that the interest would be quite enough for him to live upon, and

he gave up most of his practice, only continuing to attend a few patients from motives of charity, or as a field for experiment. With the remainder of his savings he bought "*La Souleïade*," a little property on the outskirts of Plassans, about a quarter of an hour's walk from the centre of the city, and there he established himself with his old housekeeper and his niece Clotilde, whom he had brought up as his own child.

"*La Souleïade*" was a delightful old place. It was a two-storeyed house, roofed with red tiles. It faced towards the west, and in front was a terraced stretch of pleasure ground. To the left there was a group of giant plane trees, the foliage of which gave a grateful shade in the hot days of summer. Here also was a fountain, inexhaustible even in the driest seasons, the water of which fell musically into a stone basin, half overgrown with moss.

The view from the terrace, or from the windows of the west front of the house, was extensive. A bare and desolate plain, such as one often sees in Provence, stretches away westward towards the low hills of Sainte-Marthe, which are planted with olives, and crowned by a wood of pines. The plain is traversed by a line of trees which marks the course of the little river *Viorne*. Far away on the left are *Les Gorges de la Seille*, great yellow rocks piled one upon the other like the walls of a giant fortress. On the right, almost at the mouth of the valley from which descends the *Viorne*, is the city of Plassans, a mass of red-tiled roofs, broken here and there by the green foliage of ancient elms, and above which rises the lofty tower of the cathedral of Saint-Saturnin, solitary and serene.

This landscape forms the scenery at the back of the stage on which Zola's puppets play their parts in much of the drama of Pascal Rougon's life, and the novelist has expended on it all his unrivalled powers of word-painting. He shows it to us at early dawn, when the mists still veil the distances and the shadows linger among the hills; at noon, in the blinding sunshine of Provence, when the vast amphitheatre vibrates with heat; at night, when the dark blue vault of heaven is revealed by the throbbing light of myriads of stars. A thunderstorm in awful grandeur rolls down the valley. At another time the autumn rains, pouring in torrents, blot out the details of the landscape. Or again, the mistral, blowing from the Alps, bends down the trees almost to breaking, and stays all life with its icy breath. It is Zola's consummate art that all these changes of times and

seasons respond to the emotions and the passions of his actors. The dawn, with its tints of pearl and grey, accords with the gentler feelings; beneath the star-lit night solemn questions are discussed — questions which men have asked each other for thousands of years, and are still unanswered; in the thunderstorm, the deluge, and the mistral, the human beings hear echoes of the love, jealousy, and anger which rend their bosoms with stress and fury.

The apartment in which Dr. Pascal Rougon pursued his studies, his *cabinet de travail*, was on the first floor. It was a large room, lit by three windows, which looked upon the landscape described above. The woodwork of the doors and of the cornice of the ceiling was richly carved, and dated from the days of Louis XV. As for the furniture, it is impossible to describe it, for the books, not content with filling two large bookcases, overflowed upon the floor, and struggled with heaps of pamphlets and papers for every vacant space on chair or table. The principal object in the room was an immense cupboard of carved oak, which was also the work of the eighteenth century. When the doors of this vast receptacle were open, it was seen that all the shelves were laden with an extraordinary mass of literary lumber—printed sheets of paper, manuscripts and printer's proofs — all piled up *pêle-mêle*, in admired confusion. For many years Pascal Rougon had been accustomed to store away on these shelves all the rough drafts, proofs, and manuscripts of his writings. But the confusion! The doctor himself had need of patience when he searched for a required manuscript.

Only on the top shelf reigned some attempt at order. Here were preserved the materials for the savant's great work on heredity.

It was a mere accident that led Pascal Rougon to occupy himself with this subject. It has been previously mentioned that after he set up in practice at Plassans, he continued to study anatomy by dissecting subjects obtained from the municipal hospital. During an epidemic of cholera it so happened that a series of bodies of pregnant women came under his scalpel, and he was able to make observations on the development of the fetus at various stages of intra-uterine life. The problems of conception placed themselves before him with all their mysteries. "Why and how was a new being produced? What were the laws of life—of those torrents of living beings which made up the world?" Soon the study of the cadaver was no longer sufficient.

Other questions arose in the mind of the thinker, which the tissues of the dead body, however carefully dissected, could not answer. He began to observe living humanity from the point of view of heredity. He was struck by certain constant facts which revealed themselves among his patients. Later, his own family became his principal field of observation, for here he was able to obtain precise and complete information.

Patiently he gathered together the facts. Each member of the family had a portfolio—a *dossier*—set apart for documents bearing on his or her history, and on which his or her name was written in large characters. These documents—sheets of manuscript, letters, pieces of stamped paper, articles and paragraphs cut from newspapers—accumulated from year to year until the portfolios bulged, and still the savant deemed that the data for his great work were incomplete. Pascal Rougon's family was a grand field for such studies. Its history included five or six generations, and covered a period of more than 120 years. In a recent article * I have endeavoured to give some account of this genealogy, which forms the groundwork of Zola's Rougon-Macquart series of novels.

Pascal Rougon, however, did not confine his study of heredity to the human species; he studied it among the forms of life found in the sea, for which the proximity of Plassans to the Mediterranean gave him ample opportunity. He also pursued his researches into the laws of this science as revealed in the phenomena of the vegetable world, spending much time in experimenting on the hybridisation of flowering plants.

He employed the same methods of observation in the study of disease. In phthisis, his researches led him to the conclusion that the malady was not hereditary, but that every child of a phthisical person was, so to speak, so much degenerated soil, in which the germs of tuberculosis could develop with rare facility. His idea of treatment was to enrich the soil impoverished by heredity, in order to give it power to resist the parasites, or rather destructive ferments—one must remember that when Zola wrote the last volume of his series of novels the science of bacteriology was still in swaddling clothes—which he had a suspicion were lacking in the organism. To give strength, that was the problem; and in his opinion, to give strength was also to give will-power, to enlarge the brain by consolidating the other organs.

* Zola's 'Study of Heredity,' *Journal of Mental Science*, July 1916.

While he was occupied with these studies, Pascal Rougon chanced one day to light upon an old medical treatise of the fifteenth century. In reading this ancient book his attention was particularly arrested by a method of treatment therein advocated, called "*la médecine des signatures*." According to this theory, in order to cure a diseased organ it was only necessary to take the same organ from a healthy ox or sheep, to boil it, and to make the patient drink the broth thus prepared. *Similia similibus curantur*—the idea is as old as the hills, far older than the days of Hahnemann, and no doubt lies at the bottom of the modern system of organotherapy. "In diseases of the liver," the author of the old book went on to say, "the cures are remarkable."

Pascal Rougon was something of a sceptic in medicine. He had little faith in drugs. And as there is no man who is so likely to have a pet superstition—to carry a mascot in his pocket, for example—as a sceptic in matters of religion, so there is no man so likely to become enthusiastic about a novel method of treatment, however extraordinary or even silly, as a physician who does not believe in the Pharmacopœia. "*La médecine des signatures*" appealed to Pascal's imagination. Why should he not try it? Since he wished to regenerate the hereditary feeble, in whom nervous substance was deficient, either in quantity or quality, all he had to do was to supply them with normal and healthy nervous material. Only the method of making a broth appeared to be childish. Pascal went in for a much more elaborate process. He pounded the cerebrum and cerebellum of a sheep in a mortar, macerated the pulp in distilled water, and decanted and filtered the liquid thus obtained. This liquid he mixed with Malaga wine, and administered by the mouth to such patients as, I presume, he considered stood in need of a nerve tonic. The treatment was followed by no very appreciable result.

Pascal was disappointed. However, one day when he was giving a hypodermic injection of morphia to a lady who was suffering from hepatic colic, the idea crossed his mind that he might administer the cerebral preparation in the same manner. He first experimented upon himself. He injected a gramme without any particular result. He doubled, and then trebled the dose. One morning, after a hypodermic of three grammes, administered the night before, he was delighted, on rising, to find that he had the strength of a young man. He increased the dose to five grammes, and he found that he could work with the ease and clearness that he had lost for many years.

Overjoyed, the doctor ordered from Paris a hypodermic syringe capable of containing five grammes, and set to work on his patients. His success was astonishing. Locomotor ataxic patients walked with ease; consumptives, who were at death's door, revived; and the insane, if they were not exactly cured, gave up some of their more disagreeable habits.

As Pascal held in his hand the little phial of opalescent liquid—iridescent with bluish reflections—he became enthusiastic. This was the universal panacea, the liquid of life destined to combat and conquer human debility, the only real cause of disease—the true and scientific *Fontaine de Jouvence*, which, in giving strength, health, and will-power, would re-make humanity, new and superior.

But you can't buy sheep's brains for nothing.

Dr. Pascal Rougon was accustomed to give Martine, his old housekeeper, the money for housekeeping expenses at regular intervals, and then to concern himself no more about it.

One morning as Martine was cutting the bread at breakfast-time, she remarked casually, "Monsieur, the butcher has brought his bill. It is necessary to pay it."

The doctor looked up in surprise.

"Why do you tell me that?" he asked. "Usually, you pay these bills without consulting me about them."

"No doubt, monsieur," replied the housekeeper. "I pay when I buy the goods. But this time the bill is very big, on account of all those brains with which the butcher has supplied you."

"Tell the butcher to make me out a separate account for the brains," said the doctor, brusquely.

If the new method of treatment had encountered no greater difficulties than its expensiveness, all would have gone well. But accidents will happen.

Among all the patients who had benefited from the hypodermic injections, there was no one of whom Dr. Pascal Rougon was more proud than a certain innkeeper named Lafouasse. This man suffered from locomotor ataxia. He had been ill for three years, and was in a very bad way. He was obliged to hold on to the furniture when he moved about the bar serving his customers. After a dozen injections he was able to walk without assistance, and already he extolled his cure to the world. One day, while making an injection, the needle of the syringe entered a vein, and the doctor was horrified to see his patient suddenly

become pale, suffocating, and sweating great, cold drops. In a few minutes the man was dead, his lips blue, and his face black.

To such a man as Pascal Rougon a misadventure of this description was horrible. To think that he, however innocently, should have hastened the death of a fellow creature! He was overwhelmed with the brutality, as Zola expresses it, of the death. His faith was shaken, and he was filled with anger against a science which could not cure but could only assassinate. His face was livid when he returned home, and he shut himself up for hours in his chamber, giving himself up to feelings of poignant regret.

In a small place like Plassans the story of Lafouasse's death was quickly noised abroad, and gave rise to much malicious gossip. But this did not do so much damage to Dr. Pascal Rougon's reputation as it might have done to that of a more ordinary practitioner. A quack's successes are always more talked about than his failures, whereas it is the other way about with a qualified man. I am not insinuating that Dr. Pascal Rougon was a quack—far from it. The cases are analogous, not identical.

Naturally, Pascal decided to have nothing more to do with the cerebral extract treatment. He gave up all the hopes that he had founded on what he thought was to be the alchemy of the twentieth century, and he arrived at the conclusion that it was wiser to leave evolution to accomplish its work in its own slow but certain way. However, many of the patients had received so much benefit from the treatment that they insisted on going on with it, whatever the risk might be. To please them, the doctor continued the hypodermic method, but he used distilled water in place of the extract of sheep's brains that he had previously employed. It is hardly necessary to say that the new treatment, the patients being, of course, ignorant of the change, was as efficacious as the old; so great a part does faith play in the practice of medicine.

One frequently observes that an incident, totally unconnected with the events that follow, appears to be the starting-point of a series of rapid changes in a man's life. It is like dropping a crumb into a saturated solution of alum. Not very long after the tragedy of Lafouasse's death, the notary who had charge of Pascal Rougon's affairs absconded, leaving behind him confusion and ruin. The doctor found himself suddenly thrust down from

affluence to poverty. Nothing remained to him but the house and grounds of "La Souleïade," which could only be sold at an enormous sacrifice, and what income might be gained from a neglected practice. The latter soon proved itself to be a negligible quantity; it is one thing to practise for charity and experiment, and another to do so in order to earn one's own living. At the cost of much mental agony, and entirely against the girl's will, Pascal compelled his niece Clotilde, who had become as the apple of his eye, to go and live with her wealthy brother, so that she should not be the victim of his misfortunes. And then, in the midst of his solitude and destitution, symptoms warned him that he was suffering from organic disease of the heart.

In recording the events of the last few months of Pascal Rougon's life, Zola devotes much space to the description of the fatal malady. He dwells upon the attacks of angina pectoris with painful detail, laying great stress upon the fact of the sufferer being a medical man, and that consequently he was compelled to follow the course of the disease, and watch the certain approach of death, without the relief, with which the false hopes, caused by temporary alleviation of symptoms, buoy up the ignorant.

Two circumstances brightened Pascal Rougon's last days; the first was the devotion with which a young friend, Dr. Ramond, looked after him; and the second was that a small portion of his money was recovered from the hands of the dishonest notary.

Suffering and the approach of death brought out all that was noble in Pascal's character. He set himself with calmness to arrange his affairs. He appointed Dr. Ramond his literary executor, for in addition to the manuscript of his work on heredity, there was much unpublished material in the great cupboard in the *cabinet de travail*.

During the whole of the last day of the savant's life his friend, Dr. Ramond, was at his bedside. They both knew that the end was near, and the shadow of approaching death fell even on the subjects of their conversation. Zola has instilled much pathos into his description of those last hours, and by many touches of the artist, and by many thoughts expressed by the dying man, the reader is reminded of the scene in the prison house at Athens after the drinking of the hemlock.

A man's failure in later years to fulfil the promise of his youth is not an uncommon phenomenon. It is observed in all walks in life, but particularly so in the medical profession, because in that the permanent position occupied by a man is the direct

result, in the majority of cases, of the greater or less success of his career as a student. Consequently, the more brilliant that career has been, the more marked is the failure. Such men may be roughly divided into two classes. Among the first are those who have overstrained the brain—the brain never ought to have been exposed to the strain. They have frequently passed their examinations with the highest honours, but in after life every one of their words and acts reveals the fact that their intelligence is very much below the average. They are men of whom it may truly be said that they rest on their laurels.

Those of the second class are very different. They are only comparative failures. One cannot help thinking that they are endowed with too much imagination. Their early studies, however strenuous they may have been, have not exhausted their brains. Their mental energy overflows, and employs itself on a thousand subjects alien to medicine, and medicine, being a jealous mistress, resents it. Such a man by a happy fetch may make a discovery which advances the science of healing more than the work of a generation of more prosaic beings. Brilliant as such men are, mentally they are somewhat unbalanced. They are lacking in personal ambition, the rudder that keeps one in a straight course, and also in the appreciation of physical comfort—this distinguishes them sharply from the Harold Skimpole type of man—which, quite apart from avarice, leads a man to look after himself and those dependent upon him. They pride themselves upon not being business men, and their friends regret it.

Such a man Zola has drawn in his portrait of the savant, Pascal Rougon. Had personal ambition kept Pascal in Paris, the struggle with his equals would have braced his nerves, and he probably would have attained a very high position in the scientific world. As it was, in his affairs he missed the tide “which, taken at the flood, leads on to fortune,” and consequently all his voyage of life was “bound in shallows and in miseries.”

PROVISIONS FOR THE DIAGNOSIS AND TREATMENT OF VENEREAL DISEASES BY LOCAL AUTHORITIES.

IN issuing an order relating to the treatment of venereal diseases the Local Government Board for Scotland draws attention to the importance of immediate action being taken by local authorities to extend the existing facilities for the diagnosis and treatment of venereal diseases. They recognise that the measures recommended

by the Royal Commission * cannot be successful without the active co-operation of the general hospitals of the country, and they invite hospital authorities to confer with local authorities with a view to arrangements being made for the treatment of appropriate cases. Institutions must be approved by the Local Government Board and will be periodically inspected, but no interference with the administration of the institutions is contemplated. The local authority, aided by the Local Government Board, will defray any extra expenditure incurred by the institutions in providing the required facilities for treatment.

The following is a summary of the regulations made by the Local Government Board for Scotland :—

1. Every local authority shall prepare and submit for our approval a scheme—(a) For enabling any medical practitioner to obtain, at the cost of the local authority, a scientific report on any material which the medical practitioner may submit from a patient suspected to be suffering from venereal disease ; (b) for the treatment at and in hospitals or in their homes of persons suffering from venereal disease ; (c) for placing at the disposal of medical practitioners such skilled assistance in the treatment of venereal diseases as may be required ; and (d) for supplying medical practitioners with salvarsan or its substitutes or other drugs for the treatment and prevention of venereal disease.

2. When we have approved the scheme, the local authority shall make arrangements for carrying it into effect at the cost of the local authority.

3. All information obtained in regard to any person treated shall be regarded as confidential.

Any local authority may make such provision for the giving of instructional lectures and for the publication of information on questions relating to venereal disease as the local authority may think necessary or desirable.

The Order is accompanied by a memorandum on schemes for the diagnosis, treatment, and prevention of venereal diseases, based upon the report of the Royal Commission on Venereal Diseases, of which the following is a summary :—

In the course of their investigations into the prevalence of the three great venereal diseases (syphilis, gonorrhoea, and soft chancre) the Royal Commission conclude that “except in the case of the navy and army, there are at present no means of arriving at an accurate estimate of the prevalence of venereal diseases.” But, from such information as is available, they have been led to the conclusion “that the number of persons who have been infected with syphilis, acquired or congenital, cannot fall below 10 per cent. of the whole population

* Vide *Edin. Med. Journ.*, April 1916, p. 322.

in the large cities, and the percentage affected with gonorrhœa must greatly exceed this proportion."

If this estimate be provisionally accepted, it would imply that in a city of 300,000 persons not less than 30,000 suffer either from syphilis in its acutely infectious stages or from the multitudinous effects of syphilis in its later stages. The prevalence of venereal diseases in the smaller towns, in the villages, and in the purely rural areas, it is impossible to estimate with similar precision. But it is certain that both in town and country those diseases are very widely spread.

The present unprecedented mobilisation of the population, both military and civil, creates a condition of special urgency. On that point the final report of the Commission leaves no doubt. "We desire, therefore, to place on record our strong opinion that the conditions now existing, and those that must follow on the conclusion of the war, imperatively require that action should be taken without delay. There is no reason to believe that the percentage of infection in the naval and military forces is now greater than in normal times, but there can be no doubt that the total of infected persons has increased. The military authorities are doing their utmost to provide treatment, but the civil population requires corresponding measures, and all experience shows that after a war an excessive incidence of disease is certain to occur, even in districts previously free. In order to meet present and future conditions, it is essential to make provision, and no time should be lost."

The Government have accepted the general conclusions of the Commission. To enable the local authorities for public health to deal more effectively with venereal diseases, the Local Government Board for Scotland will make grants amounting to 75 per cent. of the local authority's approved net outlays under the scheme.

The Board are satisfied that the recommendations of the Commission will be best promoted if the local authorities are required to exercise their powers through schemes especially adapted to the venereal infections as a group by themselves.

The regulations enable local authorities to make special arrangements for the three main problems in the control of those diseases: diagnosis, treatment, and prevention.

(a) *Diagnosis*.—The disablement due to venereal infections induces the patient to consult a doctor with as little delay as possible; but frequently the delay is considerable, and consequently a definite diagnosis may be impossible without special scientific investigation, which is, as a rule, too technical in character to be easily carried out in general practice even if time for such investigation were available. Further, in the majority of cases, the doctor is the sole person to receive the confidence of the patient. It follows that, if cases are to

be treated in any substantial proportion, the medical practitioner must have every practicable facility for satisfying himself of the correctness of his diagnosis. This may involve delicate and highly technical processes, which can be carried through only by a trained pathologist equipped with the proper laboratory appliances. In particular, the examination of blood by the Wassermann tests for syphilis is of so technical a nature that it can be reliably performed only by a person experienced in advanced pathological investigations. Other tests are less difficult, but it goes without saying that they are likely to be best performed by experts whose ordinary work includes large numbers of such tests.

The Board, however, do not contemplate the establishing of new laboratories for this work. The laboratories already in existence ought, at least for the present, to be enough for the whole country. The Board consider that the first element of a scheme should be an arrangement whereby every medical practitioner can, without difficulty or delay or cost, obtain a scientific report on materials submitted by him.

(b) *Treatment*.—That the various methods of treatment may be available to the greatest number of patients, it is essential that the local authorities should utilise to their greatest practicable extent all existing medical institutions, and that every effort should be made to secure the intimate and whole-hearted co-operation of the medical profession in all its branches. Without such co-operation no scheme can achieve real success.

Accordingly, the Board provide for treatment (1) in hospitals, (2) at the out-patient departments of hospitals, (3) at other institutions where treatment can be carried through, and (4) in the patient's own home.

Further, as the process of treatment in certain cases may be both difficult and dangerous, it is desirable that all medical practitioners should have at their disposal any skilled assistance they may require, free of cost to him or his patient. It is expected that all medical practitioners will recommend to the institutions all cases suitable for institutional treatment; but in many cases it may, on many grounds, be preferable to have the patient treated at home. By providing the skilled assistance necessary for treatment at home the local authority will facilitate the work of the medical practitioner, and at the same time enable him the better to respect the confidence of his patient.

With a view to securing that the largest numbers of affected persons shall benefit by the schemes the Board lay special emphasis on the need for regarding all professional information concerning the patient as confidential.

(c) *Prevention*.—The local authority are empowered to provide for

instructional lectures and the diffusion of information on questions relating to venereal diseases. For such purposes the local authority and their officers should co-operate with all medical schools, colleges, and institutions, with the police, poor law and education authorities, and with all organised bodies of social workers concerned in the prevention of venereal diseases. The Board will consider favourably liberal provision for giving effect to the powers conferred by this article.

To obtain approval for a scheme the local authority must conform to certain conditions which are specified in detail in the memorandum.

It is the intention of the Board that salvarsan and other drugs should be supplied free; but salvarsan and its substitutes, which are administered by intravenous injection, should be supplied only to such medical practitioners as can show satisfactory evidence of training or experience in the administration of these drugs. The medical officer of health should be responsible for the distribution of these drugs, and the medical practitioner, in applying for a supply of salvarsan or its substitutes, should state whether he possesses certain specified qualifications for administering the drug.

CLINICAL RECORDS.

A CASE OF SPOROTRICHOSIS.

By DAVID M. GREIG, C.M., F.R.C.S.

IN March 1913 Dr. C. S. Young referred to me a man, aged 39, who was suffering from ulceration of the skin about the right shoulder and breast, of two years and four months' duration. A native of Roseneath, he had been brought up in Dundee. His family history was a good one. His father, well, was aged 68. His mother had died, aged 66, apparently from a cerebral cause, and only survived the first symptoms of her illness an hour. The patient was the oldest of seven. One brother had died at the age of 4 years. The others were in good health.

After leaving school he was for some time a box-maker. At 16 years of age he went to sea, where he served during three years. For part of that time he was employed in New Jersey, U.S.A., "in the swamps," and there had malaria, which he continued to have off and on during the subsequent ten years, but he had not had an attack since 1899. He is unmarried. He went to South Africa in 1896 to Port Elizabeth, and thence to Kimberley, and thereafter was employed diamond mining, prospecting, and diamond digging on the banks of the Vaal River. He had never had a day's illness, he states, other than the malaria above mentioned. About 1903 he had a slight

attack of gonorrhœa, but had no other venereal trouble. He served for fourteen months in Brabant's Horse during the South African War. He is perfectly definite that, except when he had some teeth extracted in Port Elizabeth about 1899, he had "never had a day's illness and never missed a shift at work, and even malaria never kept him more than a day out of sorts when it came."

He was working as a mine employee on the 6th of December 1910, and must have hurt the little finger of his right hand with a piece of the rock which he was working amongst, though he thought nothing of it at the time, for when he got home he noticed that it had been bleeding and that it was cut. He says that the rocks and the Oregon pines he had to handle always gave rise to dirty wounds, and he therefore poulticed the finger "to clean it." It healed in a day or two. Two or three days after the cut had been inflicted a swelling started in the armpit, and three days later, on 12th December, he consulted the doctor at the mine about it. After poulticing the axilla until 23rd December the doctor "lanced it." This axillary wound kept discharging until 9th January 1911, when he was sent into the Johannesburg General Hospital. He was in that hospital for a year and nine months. On the 10th of January 1911 he had "the arm-pit scraped," and the report from the Government Laboratory was "no tubercle." It was scraped about every two months till he had been almost eight months in hospital. About March 1911 he was started on an injection hypodermically of "sodium," and he had forty injections of that and felt better after it. After the "sodium" was stopped a vaccine was made from the arm, and he had ten injections. That, too, made him feel better. Then a fresh vaccine was made, and he had ten injections of that. The injection seldom gave him any rise of temperature. About the middle of November 1911 the doctors decided to open the part at the arm, and, in doing so, he says an artery was cut and his arm was bandaged to his chest, artery forceps being left on the vessel for six days and nights. The laboratory report said the condition was not tuberculous and not malignant.

The parts began to break down at once after that, and other abscesses formed and burst, and one was opened. Some were drained, and some were packed. Ulceration set in, too, in March 1912. About that time he had an intravenous injection of salvarsan. He had never had syphilis, but expressed his willingness to have the salvarsan to see if it would have any effect. He says he felt better from the injection, but it made no difference to the sores, and as the ulceration proceeded he lost weight. He returned to this country in September 1912.

In November 1912 he consulted a well-known surgeon, who told him it was tuberculous, and he had the bridges of skin cut and all the bad skin removed under an anæsthetic, and "about ten tubes" put in. A month later he had another excision of tissue. He thought some

improvement followed these two operations, and the large ulcer showed some signs of healing, but a fresh abscess formed at the back of the right shoulder, and the scar tissue which had formed then began to break down again.

The history above related is one which could only have been given by a man of exceptional intelligence and observation, and the accuracy and detail enhance its value. When I saw him in March 1913 the condition was as shown in the photograph. From the clavicle to within 2 ins. of the right nipple extended an area of cicatrization and ulceration which had very definite edges. The ulceration passed under the arm to the back of the axilla, but it was not possible to raise the arm up to see it. There appeared to be an abscess under the deltoid near its insertion, for it was swollen there, and soft and fluctuating. There was a drainage tube in front of the clavicle, and another behind at the posterior part of the axilla. Over the 6th costal cartilage, on a level with the nipple, was a recent patch, suggestive of tubercle in its general appearance, and about an inch square. He was thin and looked anæmic. From 10 st. 8 lbs. in his clothes his weight had fallen to 8 st. 5 lbs. He complained of sleeping badly on account of the pain about the soft parts.

In the main ulceration it was hardly possible to realise what the original appearances had been, but the patch over the 6th costal cartilage had recently developed and had not been interfered with, and therefore showed unimpaired the characteristic lesion. It was almost square, and was of a brown colour from discoloration of a thin layer of epithelium which covered a soft infiltrated area, and through a few minute openings in the epithelial covering exuded a thin pus. The appearances were essentially those of a subcutaneous affection and not of an infection from the surface. Under an anæsthetic parts were taken for examination, and the abscess at the deltoid incised.

The dressing consisted in painting the area daily with 2 per cent. solution of iodine in rectified spirit, and the patient was given 10 grs. of iodide of potash internally three times daily. He was given no mercury. The iodide was dissolved in an infusion of gentian to which some aromatic spirit of ammonia had been added. A radiogram showed the bones forming the shoulder girdle very transparent, as one would expect to find, for when bones have been long out of use their calcification becomes modified, and the shadow cast in radiography is less distinct than normal. The iodide of potash was gradually increased until he



To Illustrate Mr. Greig's Case of Sporotrichosis.

was taking 25 grs. thrice daily. The treatment was commenced on 21st April 1913, and the wounds were entirely healed and the œdema of the upper limb gone by 2nd January 1914. He had put on flesh, and had become much fatter and of better colour. His arm, which was pretty much fixed by adhesions from the ulceration in the axilla, remained in that position. He took his food well, and had no complaints. At no time was the dressing other than painting the entire ulcerated surface with 2 per cent. iodine in spirit daily or twice daily, and his appreciation of the benefit he was receiving, and his anxiety to assist the treatment, enabled him to overcome any temporary nausea the iodide internally produced on occasions. For a few days at a time he would be on a smaller dose, but as soon as he overcame the nausea he returned to his 25 grs. thrice daily.

That a case of such rarity should have come my way, after having been reviewed by so many competent observers, is one of those fortunate circumstances which from time to time occur to stimulate professional enthusiasm. In view of the history alone, the diagnosis presented no difficulty; it was written and made plain "that he may run that readeth it." To consider for a moment what the ulceration might have been, there were these possibilities — (1) Tubercle; (2) syphilis; (3) carcinoma; (4) one of three—actinomyces, streptothricosis, or sporotrichosis. Except the last division all of these had been ruled out before I saw him. The fresh ulceration was unlike tubercle, and the history and the absence of repair in any part should have been sufficient warning. As regards syphilis, he had not inherited it; he denied that he had acquired it, and all antisiphilitic treatment had been futile. Malignancy seems to have been examined for more in routine than in expectation, and the pathologists' *dictum* had been readily accepted. How many a clinician is shipwrecked between the Scylla of syphilis and the Charybdis of tubercle!

Repeated examination by competent pathologists could not have missed the actinomyces had that been the cause of the ulceration. Nor were the clinical evidences of actinomyces present. Streptothricosis presents greater difficulty in clinical, as it does in pathological, recognition; but here, too, the repeated examinations during two years ought to have yielded positive evidence. Actinomyces and streptothrix had been searched for by Professor Sutherland, to whom I submitted my specimens before he pronounced confirmation of my diagnosis. The sporotrichon *Beurmanni* presents much difficulty in recognition in

the tissues, as it presents peculiarities in culture in medium and temperature, and the absence of a detailed pathological report must be ascribed, not to any lack of enthusiasm, but to a regrettable intersessional somnolency for which I am not responsible.

Sporotrichosis is one of the rarest skin affections found in this country, and mine did not occur, but was imported. Indeed, with one exception,¹ all cases, so far as I know, have been imported cases. The originating injury seems to be invariably inflicted by abrasions or cuts during the handling of certain rocks or earth. The initial lesion is slight and appears trifling. The secondary lesions are extensive, progressive, and a danger to life. The affections which follow the local inoculation sore may take the form of subcutaneous abscesses or cutaneous ulceration, the latter being spoken of by some authors as syphiloid or tuberculoid—an indication of the difficulty of recognition.³

The indication for treatment, even more than in actinomycosis and streptothricosis, is medicinal rather than surgical. The administration of iodide internally, and pushed to the limit of endurance, together with the application of iodine externally, resulted in rapid improvement and ultimate cure. Had this treatment been adopted earlier in the disease there is no question that the man would have had a much more useful upper extremity than he ultimately had, for it cannot be doubted that much of the cicatricial contraction was due to the attempts at surgical removal of the affected parts.

Since his recovery the patient has been again in South Africa. He has not only earned his own livelihood, but has trekked up-country, prospecting on his own account, and he does not admit that the stiffness of his shoulder incapacitates him from life on the veldt or from any work he is likely to undertake. He is a man of fortitude and determination.

REFERENCES.—¹ Walker, N., and Ritchie, J., "A Case of Sporotrichosis," *Brit. Med. Journ.*, 1st July 1911. ² Adamson, H. G., "Case of Sporotrichosis," *Trans. Roy. Soc. Med.*, London, 1911, vol. iv. (Dermat. Sec., p. 114). ³ *Ibid.*, "Case of Sporotrichosis of the Disseminated, Ulcerating, Gumma Type, in which there occurred Acute Synovitis," *Trans. Roy. Soc. Med.*, London, 1913, vol. vi. (Dermat. Sec., p. 70). ⁴ Tilley, H., "Aspergillosis of Maxillary Antrum," *Trans. Roy. Soc. Med.*, London, 1915, vol. viii. (Laryngol. Sec., p. 20).

A CASE OF SUTURE OF A PERFORATING WOUND OF THE HEART.

By J. FRASER, F.R.C.S., Capt., R.A.M.C.

IN two instances lately our attention has been drawn post-mortem to death resulting from small penetrating wounds of the heart. In each case the patient succumbed from 6 to 8 hours after the injury had been received, and death had apparently resulted from the accumulation of blood within the confines of the pericardium. In both instances the situation and the character of the wound was such that it would have proved perfectly suitable for suture. The occurrence of these two cases suggested to us that in a certain percentage of such cases death might be prevented by exploration and suture.

Shortly afterwards an opportunity occurred of putting our idea to a more practical test, and the following is the record of that test:—

History.—A soldier was admitted with multiple small bomb wounds of the face, chest, and arms; both eyes were perforated.

Immediately internal to the left nipple there was a wound measuring about $\frac{1}{4}$ in. square; from it there was a steady ooze of rather dark blood.

The general condition was fair; no intense shock was present; the body showed a general slight cyanosis; the pulse was interesting; its rate varied, but averaged 100 per minute; its beat was noticeably irregular: the average amplitude was small, but at intervals a single beat of larger amplitude occurred, to recur later.

Remembering one's former post-mortem experience, it was recognised that in this case the clinical features were extremely suspicious of the heart wall having been perforated. It was decided to explore the condition.

From the centre of the sternum an incision 4 ins. long was made outwards along the line of the 6th costal cartilage and its rib. The cartilage, with about 1 in. of rib, was removed subperiosteally. The 5th costal cartilage was isolated on its superficial and deep surfaces, and the cartilage divided close to its junction with the sternum. A flap of the chest wall could now be retracted upwards and to the left. Bleeding was encountered from the internal mammary artery; the main vessel was therefore

ligatured. An area of fat was exposed lying in front of the pericardium and pleura; this was separated, and the pleural reflection separated laterally. The anterior wall of the pericardium was exposed, and its perforation by the fragment was identified; blood continued to escape from the perforation. The pericardium was now freely opened in an oblique direction, and the heart was exposed to view. Free blood lying in the pericardial cavity was removed. In the situation of the auricular-ventricular septum there was an extensive subendocardial hæmorrhage. Immediately above the septum in the anterior wall of the right auricle there was a small valvular perforation directed inwards and upwards and measuring about one-eighth of an inch.

It was noted that blood had a greater tendency to escape from the perforation at each respiration rather than during the cardiac cycle.

With needle-holder and a small fully curved needle a stitch was passed through the auricle wall, and by traction on it the situation of the perforation was brought to the surface. This was done without any difficulty.

The perforation was closed with a couple of mattress sutures, the edges of the perforation being everted.

The foreign body was not seen. The opening in the pericardium was partly closed with interrupted catgut sutures. Drainage was secured by a small rubber tube.

The after progress of the case was practically devoid of incident as regards the cardiac condition. For a time the temperature continued to swing, but later it subsided.

Owing to perforation of the globe it was necessary to remove one of the eyes later; a certain degree of sight was retained in the other eye.

A letter from the patient, received four months subsequent to the operation, states that he is enjoying excellent health.

It is probable that a certain proportion of cases of this type are occurring. Immediate operation offers the best chance of their recovery; otherwise they die of progressive loss of blood and embarrassment of the heart's action from accumulation of blood in the pericardium.

SIMULATION OF ACUTE APPENDICITIS BY SUPPURATION
AT THE ABDOMINAL INGUINAL RING, FOLLOW-
ING GONOCOCCAL AFFECTION OF THE DUCTUS
DEFERENS.

By J. W. DOWDEN.

A. B., aged 20, was admitted to the Edinburgh Royal Infirmary with fracture of the base of the skull. His condition was severe, and pointed to laceration of the brain, and for a week his temperature varied irregularly between normal and 101° F. Afterwards improvement rapidly took place.

About three weeks after admission the resident surgeon sent for me, as he suspected acute appendicitis. On my arrival an hour later all symptoms had disappeared, and the temperature, which had been 99·2° F., was then normal. Another week passed, and again there was a recurrence of the same abdominal pain. The right leg was slightly flexed, and there was some rigidity in the right inguinal region. Severe localised tenderness was present over the abdominal inguinal ring. There was no tenderness or enlargement of the ductus deferens or epididymis; no urethral discharge at that examination. Temperature had been 99° F., but was again normal. The history was pain in the right inguinal region, coming on gradually, and getting very severe, associated with nausea; no history or evidence of hernia.

This examination, and the history not being typical in its order of acute appendicitis, namely, severe colicky pains across the abdomen, followed by nausea or vomiting, and, lastly, localised pain in the right iliac region, with tenderness on pressure, led one to suspect that it was some other condition, but as it might have been an atypical case of appendicitis in the pelvis, rectal examination failed to afford any corroborative evidence. The onset of two attacks in the week, however, was somewhat suggestive. Taking everything into consideration, inflammation of the ductus deferens was placed out of count, as no signs could be made out of thickening of the ductus deferens, and no evidence of associated infection. A diagnosis was made of possible strangulation of an appendix in a small hernial sac. Operation was advised owing to the pain, and under the anæsthetic a distinct firm area was made out at the abdominal inguinal ring. The usual incision for inguinal hernia was made, and the external oblique aponeurosis slit up. There was no hernial sac. The ductus deferens was thick and inflamed at this site for about an inch, and on tracing it up to the abdominal ring numerous adhesions were found. Just at the ring there was suddenly evacuated about three or four drops of whitish purulent fluid, which were lost in the wound. A smear, however, was taken from this region, and later a report came that it showed diplococci, conforming in all respects with gonococci.

The after-history was uneventful, except that a slight urethral discharge was found, and the history of the case confirmed the condition.

The object in this note is to record a case of interest to operating surgeons, a rare difficulty in diagnosis that may arise. So many cases of acute appendicitis are seen and operated on, that one is tempted to make a rapid diagnosis, and carry out a futile operation so far as the pain is concerned.

OBITUARY.

ADAM ROBERT TURNBULL, M.B., C.M.(Edin.).

It is with great regret that we record the death, at Colinton, on the 17th November, in his sixty-third year, of Dr. Adam Robert Turnbull, late Medical Superintendent of the Fife and Kinross District Asylum at Springfield.

Dr. Turnbull had a conspicuously brilliant course as a student of medicine at the University of Edinburgh. He took a high place in all his classes, gaining ten medals with over 90 per cent. of the marks available, and in the subject of midwifery with no less than 98 per cent. He graduated in 1875 with first-class honours, and was awarded the Ettles Scholarship as the most distinguished student of his year. His fellow-students showed their appreciation of his talents and character by electing him Senior President of the Royal Medical Society.

After a period spent as Resident Physician in the Royal Infirmary he was appointed, in 1876, Assistant-Physician in the Royal Edinburgh Asylum, Morningside, under the late Sir Thomas Clouston. There never was an assistant more popular than Turnbull—"Little Turnbull," as he was affectionately called. He was loved by all, patients and officials alike. The most exacting of patients' kinsfolk, the most critical of parish officials, were disarmed by his genial smile, his ready assumption of all blame, his innocent cajolery, the honesty of his desire to put things right.

In 1881 he was appointed Medical Superintendent of the Fife and Kinross Asylum in succession to Dr. Brown, an old Morningside assistant, who had been killed in a carriage accident. His predecessors were Dr. John Fraser, late Commissioner in Lunacy, and the late Sir John Batty Tuke. With the great increase of the mining population in this district the institution was transformed under Turnbull's direction from a quiet little country asylum into one of the largest and busiest hospitals for the insane in Scotland. All his energies were devoted to the betterment of the insane, but his name will be most permanently associated with the initiation of the modern method of caring for sick male patients by placing them, by day at least, entirely under the charge of female nurses. Although introduced on



[Portrait by W. & A. Smith, Dundee.]

DR. ADAM ROBERT TURNBULL.

a small scale, the success of this experiment was very obvious, and, under encouragement from the Board of Lunacy, it spread over Scotland and became perfected in detail and extended in scope. Owing to the shortage of male attendants since the war began this method has been adopted in England as well.

For several years Dr. Turnbull acted as Secretary of the Scottish Division of the Medico-Psychological Association, and in 1910 that association conferred on him the honour of electing him President, but, greatly to the regret of all the members, ill-health prevented him from undertaking the duties.

As he drew near his sixtieth year Dr. Turnbull's health suddenly failed, and it was found he was suffering from a painful and incurable malady. After holding his appointment for thirty-four years he resigned in February 1915, his good and faithful services being recognised in very appreciative terms in the official records and public prints. He lived only a year and nine months to enjoy his pensioned leisure, and died suddenly of cerebral hæmorrhage.

Dr. Turnbull was one of the gentlest and most modest of men—absolutely devoid of “side,” tender of the feelings of others, respectful of their opinions, and deferential even to his manifest inferiors. The writer feels this a most inadequate tribute to the memory of a blameless character, one of the kindest, the bravest, and the best.

G. R.

DR. P. G. BORROWMAN.

DR. PHILIP GRIERSON BORROWMAN died at his house in Great King Street in Edinburgh, at the age of sixty-two, on 16th December, after a very short illness. He had been enjoying fairly good health, when he was seized with influenza, and after a few days' illness succumbed to heart failure.

Philip Borrowman was the son of the Rev. Patrick Borrowman of Glencairn, in Dumfriesshire, one of the ministers of the Church of Scotland who “came out” at the Disruption. He graduated M.B., C.M., at Edinburgh University in 1882, and took the degree of M.D. in 1902. After working for a few years in Scotland he went to Ceylon, where he practised for four years. When he came home in 1890 it was found that his health would not permit his return to Colombo. In 1891 he began practice in Elie, but left that in 1899 for Crieff, where he bought the late Dr. Thom's practice. His health, however, was not equal to the strain of a country practice, and nine years later he had to leave Crieff on that account. For the last six years he had practised in Edinburgh. At the time of his death he held the appointment of surgeon to the Mounted Constables.

Dr. Borrowman had all through his career to struggle with indif-

ferent health. He was subject to asthma, and each summer brought an unwelcome and irritating visitor in the shape of hay fever. But he bore such troubles—no slight ones—bravely and quietly. He gladly gave his strength in these days to “war work,” taking the place of younger men who had gone abroad.

Had his health permitted, there is no doubt country practice would have suited him well. He was proud of his knowledge of horse flesh, and enjoyed nothing more than to “throw his leg over a horse” and ride through the country. Of handsome features and courteous manner, he was a man of truly devout and reverent and religious spirit. He was a staunch adherent of the Church of Scotland. He is survived by his widow, a daughter of Rev. Charles Mackintosh of Tain and Dunoon, and a daughter and two sons. The elder is a minister of the Church of Scotland, and is at present working with the Y.M.C.A. in France, and the younger is an officer in the Indian Army with the forces in Mesopotamia.

J. S. M'L.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

W. T. RITCHIE, M.D., EDWIN MATTHEW, M.D., J. D. COMRIE, M.D.,
AND A. GOODALL, M.D.

CARDIAC CURVES AND SOUNDS.

IN a paper of rather polemical character Stephens (*Dublin Journ. of Med. Sci.*, October 1916) urges some points of very considerable importance. It is remarkable that the conditions under which the pericardial fluid exists should have for so long escaped the notice of physiologists and pathologists. The pericardial sac contains from 20 to 30 c.cm. of fluid, and this fluid during life is distributed all over the surface of the heart. The pressure within a series of pericardial sacs as measured by a manometer in a slaughter-house was found to be negative and equivalent to 3 to 4 per cent. of water. When the heart contracts, its size is reduced, and thereby the intrapericardial space becomes increased, with an accompanying modification of its negative pressure. With the enlargement of the heart during diastole there is less room for the pericardial fluid, and it is asked whether this increased intrapericardial pressure has anything to do with the cardiac impulse. Experiments were subsequently made with Mackenzie's polygraph, using receivers of different diameter. When three tracings, taken with receivers of one, two, and three inches diameter, were compared, they showed but little

resemblance. Three tracings taken in a similar way from a case with slight pericardial effusion showed a closer resemblance, possibly because the fluid contents of the sac were of great account. It is asked whether the tracings are due to waves of pericardial fluid. The possibility of the heart sounds being due, in part at least, to movements of pericardial fluid is mentioned.

EPILEPSY.

A considerable amount of work in connection with the possible causes of epilepsy has recently been published in American journals. Reed (*New York Med. Journ.*, 16th September 1916) summarises views which he first enunciated at the beginning of the year. For several years he has been dealing as a surgeon with cases of adhesions, distortions, and malformations of the intestines. It so happened that some half a dozen of these patients suffered from epilepsy. Little attention was paid to it at the time, but at a later date these patients all reported that they had recovered, not only from the constipation, but from the epilepsy. Researches were instituted, with the result that a large spore-bearing bacillus has been isolated from the blood, sometimes by smears, more frequently by cultures. It is very motile. As it becomes older it forms chains, and sporulation becomes evident. After 12 to 15 days the organism dies, leaving spores in great numbers. The bacillus stains best with carbol-fuchsin. In consequence of the high resistance of the spores it is immune to phenol.

Intravenous inoculations in rabbits caused convulsions typical of epilepsy.

The initial cry, the fall, the convulsions, the lateral nystagmus, all took place, lasted 3 to 5 minutes, and were followed by a period of stupor, and this in turn was succeeded by a period of perfect health. Large doses caused death *in statu epileptico*. Small doses caused a series of typical convulsions followed by recovery, thus showing the ability of natural immunity to overcome the infection in the absence of a focus of continuous supply. In some cases convulsions followed administration of the organism to rabbits by the mouth. In all cases in which the disease was induced in rabbits the organism was recovered from the blood. The organism, *bacillus epilepticus*, seems to conform to the law of Koch. The bacillus has been found in the small intestine, caecum, appendix, colon, and mesenteric glands, as well as in the blood of the same patient. It can be traced from the food to the blood by way of the alimentary canal in rabbits. It probably has its primary abiding place in the upper strata of the soil. It may be carried from the soil to the mouth. Its resistant properties enable it to withstand digestive juices till it reaches the caecum, whence, under the influence of colic stasis, it is forced into the circulation. Constipation is the one clinical condition most commonly correlated with epilepsy, and under-

lying the constipation is some mechanical interference with the faecal current. The mechanical interference, while constant in principle, varies in detail. With the establishment of any systemic infection we find toxæmia, acidosis, and the superhydration or œdema of the various structures. The toxæmia of epilepsy is shown by the constant tendency to subnormal temperature, and by the elimination of various toxic products in the urine. Chronic acidosis exists in all cases of epilepsy. Acidosis of this character is followed by œdema of the organs and structures upon which the primary infection exercises a selective action, and so it would seem that bacillus epilepticus exercises its terminal effects by producing a deinsulating œdema of the conduction paths of the brain as in purely convulsive disturbances, or of both the conducting paths and the cortex, as in convulsions with psychic explosions. This process of selective action finds analogies in the action of the pneumococcus on the lung, the meningococcus on the meninges, the tetanus bacillus on the nerve trunks, and the gonococcus on mucous membranes. The œdematous process in epileptics with advanced infection and profound acidosis may be seen in puffiness about the eyes and ankles, often associated with a slight albuminuria indicating a general process of which that in the brain is but one although a primary and essential manifestation. An analogous condition is found in toxic pregnancies in which, as in epilepsy, the associated œdema reaches its maximum immediately before convulsion.

It appears necessary to broaden our usual grounds of investigation. The neurological examination must continue, but in addition the blood must be examined for bacillus epilepticus and for its cellular content, etc. The condition of the intestines must be examined by X-rays. The saliva and urine should be examined for evidence of acidosis.

Hinkelmann (*ibid.*) reports that he has for some time worked with an organism which he believes to be identical with that of Reed. It is a very frequent inhabitant of the intestine of probably the majority of people. It has a high resistance to germicidal agents, and through this fact it becomes an easy matter to demonstrate its presence in the intestinal flora. It will live in phenol solutions of from 5 to 10 per cent. for many hours, and a much higher strength is required to kill it instantly. Among the very large number of different bacteria which are usually found in the intestines it is commonly the only one that will survive a thorough treatment of the stool with a 5 or 10 per cent. phenol solution. The method of isolation was to make 25 to 30 grams of fæces into an emulsion with 50 c.c. of a 5 per cent. solution of phenol and allow it to stand for 30 minutes or an hour. Cultures were incubated on agar slants. The organism is highly hæmolytic, and to this fact may be due a part of the pathological conditions present in epileptics. Cultures made on blood-agar plates will show a hæmolytic spot at the point of a growing colony long before the colony itself

becomes visible. In view of the fact that the organism enters the circulation and there multiplies in great numbers and is so generally found in the blood of epileptics, the conclusions of Reed as to its specific nature become, at least, very plausible. The question is at least worthy of extensive investigation. The universal presence of the organism in the intestinal flora is no argument against its probable pathology, but simply adds to the importance of the gateway through which it enters the blood-stream in considering treatment. If further investigation finally establishes that *bacillus epilepticus* is the exciting cause of the seizures of the disease, little can probably be hoped for in the way of prophylaxis or cure, through efforts to prevent the organism from entering the intestinal tract or to eradicate it when present. Our best attention will probably have to be directed towards lesions which open a way for it from the intestines into the circulation.

Cotton, Corson-White, and Stevenson (*ibid.*) suggest that epilepsy is probably not a distinct homogeneous disease process, but rather a symptom of several pathological conditions. After referring to the work of Reed, and the view brought forward by McKenna, Johnston, and Heminger, that epilepsy may be due to disturbance of the pituitary, they go on to record the results of their investigations by means of the Abderhalden reaction in epilepsy. In 69 cases of epilepsy they found that a large percentage gave a positive Abderhalden reaction to suprarenal gland but were negative to other glands tested, viz. pituitary, thymus, thyroid, pancreas, testis, and ovary. The only exception was a case of status epilepticus which reacted to pituitary. In over 200 cases examined by the method, including dementia præcox, maniac depressive insanity, general paralysis and senile debility, all except the so-called idiopathic epileptics gave a negative reaction to suprarenal. In order to study the relationship of this gland to epilepsy it is necessary to understand some of the physiological activities of the suprarenal. Mere excess of suprarenal does not cause epilepsy, but one of the principal actions of the gland is to inhibit the visceral muscle fibres of the intestine as well as to raise the blood-pressure.

Suprarenal excess may be brought about by (1) disturbance of the pituitary; (2) removal of the pancreas; (3) irritation of the duodenum; (4) fright. There may be other causes, but there is experimental evidence for the four stated. The conclusions reached are (1) that at least one type of epilepsy is probably dependent upon absorption of toxins from the alimentary canal; (2) that intestinal stasis may be produced by an overaction of the suprarenal gland; (3) that hyperactivity of the suprarenal may be caused as stated above; and (4) that the most efficient means of controlling this hyperactivity is the administration of pancreatin. This treatment should be employed in preference to surgical procedures. These, however, should be adopted in long-standing cases where other treatment has failed.

Spangler (*ibid.*) records a large number of observations on the blood of epileptics. He holds that the attacks in many of the so-called idiopathic cases are caused by a toxin which is carried in the blood. The exact nature and origin of the toxin is at present undetermined. An accumulation or intensity of this toxin in an epileptic will cause an attack, associated with a general leucocytosis, but not an eosinophilia. The blood of an epileptic injected into an animal causes a general leucocytosis with eosinophilia, *i.e.* the epileptic toxin thus inoculated into an animal produces a positive chemotaxis for the eosinophil cells. A patient afflicted with epilepsy in most instances does not produce or has lost the power to produce an eosinophilia; the toxin is not antagonised and an attack occurs, *i.e.* in a patient afflicted with epilepsy the toxin is negatively chemotactic for eosinophil cells.

The coagulation time of the blood is shortened before an epileptic seizure. The range of the clotting time in 85 out of 100 cases during the intraparoxyssmal period was shorter than in normal subjects. The alkalinity of the blood is lower in cases of epilepsy than in control non-epileptic subjects on the same diet. The hypodermic injection of crotalin in properly regulated doses has produced moderate degrees (8 to 15 per cent.) of eosinophilia, has lengthened the clotting time, and increased the alkalinity of the blood in certain epileptic patients, thus greatly modifying the character of the seizures and in some cases keeping an attack definitely in abeyance.

The eosinophilia produced in an epileptic subject by crotalin injections seems to antagonise the epileptic toxin and, possibly by the formation of antibodies, neutralises the toxin and prevents attacks.

A. G.

SURGERY.

UNDER THE CHARGE OF

J. W. STRUTHERS, F.R.C.S., D. P. D. WILKIE, F.R.C.S.,
AND JAMES M. GRAHAM, F.R.C.S.

REMOVAL OF THE RIGHT COLON: INDICATIONS AND TECHNIQUE.

IN selected cases of constipation great benefit can often be obtained by the removal of the absorbing area of the colon. This surgical procedure is not advisable in ordinary cases of constipation, but is indicated in severe cases associated with toxic symptoms sufficient to disable the patient, and in cases which have resisted ordinary medical treatment.

Charles Mayo (*Journ. Amer. Med. Assoc.*, 9th September 1916) has performed general colectomy in a few cases, and the right or lateral colectomy in a larger number, and is of the opinion that, except in cases where there are tumours or local lesions, the latter operation yields as satisfactory results as the more extensive operation. Excision

of the entire colon seems specially liable to lead to adhesions of the intestines, and, as Clark has recorded, subsequent operations may be necessary.

In operating on the right colon an incision should be made in line with and through the fibres of the right rectus muscle. It is important to have a sufficiently long incision to give good access. A general examination of the abdomen should be made in order to exclude malignant disease or other lesions. If extirpation is decided on, extensive gauze packing is adjusted to the inner side of the colon, and an incision is then made through the peritoneum immediately to the outer side of the bowel. The colon can now be mobilised and brought outside the abdomen. The space to the outer side is filled with gauze packing. The mesentery of the ileum is perforated, and the ileum divided between double clamps 3 inches from the ileo-caecal valve, the cut ends being sterilised with the cautery. The mesentery of the caecum and ascending colon is next divided from below upwards to the transverse colon, and the omentum is ligated from the right one-third of the transverse colon. The bowel is now removed by dividing the transverse colon between clamps, the stump being cauterised. In non-malignant cases the peritoneum is divided close to the colon, and the ureter does not come into view.

The closure of the end of the colon is done as follows, a straight needle and chromic catgut being employed. The needle is inserted through the serous and muscular coats first on one side and then on the other, the suture passing in the form of loops, which are left loose, over the clamp in position. Having inserted this suture, a second clamp is applied 4 inches away to control the contents of the colon.

Mayo employs a Murphy button for making his anastomosis, and the next step is to remove the clamp at the cut end of the colon, to open up this end, and to introduce the female half of the Murphy button within the colon, where it is left loose. The suture already introduced is now tightened, peritoneal surfaces being brought in contact, and the end of the colon is closed, a second suture being introduced to make the closure more satisfactory, the ends of the latter suture being left loose for subsequent fixation of the blind end to the abdominal wall.

The end of the button is now projected against the wall of the colon opposite a longitudinal band at a point $2\frac{1}{2}$ inches from the divided end, and a small incision is made through which the neck of the button is projected, no suture being required. This is held in place till the other half of the button is fixed into the end of the ileum by suture. The end-to-side union can next be completed by bringing the two halves of the button together. A few extra sutures can be inserted to make the anastomosis sounder.

Mayo believes that this method is safer than union by suture, and

that an end-to-side junction avoids the risk of dilatation of the blind ends, which is apt to follow a side-to-side anastomosis. The opening in the mesentery and the gap in the peritoneum to the outer side of the colon must finally be closed by sutures.

As the wound in the parietes is being closed, the stump of the colon is pulled upwards, so that it lies at the level of the muscle, which is closed above and below it. The long suture left at the closed end is brought out on to the skin, and a strip of gauze is inserted down to the end of the colon. The latter precaution is taken in case there should be great distension during the fourth to sixth day. Peritonitis following resection of colon is most likely to be due to necrosis and infection from the blind end. In a series of twenty cases in which the Murphy button and implantation of the end of the colon have been employed no fatal result has followed. Further, in cases of distension relief may be given by pulling on the thread and inserting a fine, pointed pair of forceps into the colon, passing through the sutured line so that gas may escape. If this is unnecessary, the suture is cut on the sixth day and the gauze is removed, allowing the wound to heal. This safety-valve method proved of great service in about 15 per cent. of the cases.

The method of operation thus described is safe and effective in tumours, granulomata, and fistulas. In cases of toxæmia the general condition is improved, and in 80 per cent. of cases the constipation is relieved.

Mayo remarks that in operating on the left colon for obstructive conditions, either by the Mikulicz-Brüms method or by resection, appendicostomy is of great value.

THE USE OF ELECTRIC LIGHT IN THE TREATMENT OF WOUNDS.

Crile (*Surg. Gynec. and Obstet.*, October 1916) recommends the use of electric light in combination with hypochlorous acid for the treatment of septic wounds. For some years electric light has been employed in treating burns and obstinate ulcerative surfaces, such as are due to varicose veins.

Dubouchet has utilised this means of treatment in septic wounds in the American Hospital in Paris. The method was tried by Dr. Crile in France with favourable results, and he has since introduced the use of electric light for various kinds of wounds in civil practice.

Wounds heal remarkably well in desert places such as Arizona, where the air is dry, rarefied, and the rays of the sun are direct. It is probable that the beneficial effect of electric light exposures is due to the establishment of similar conditions ideal for a natural cure. Analysis of sunlight and electric light show them to be almost identical. While the value of the Finsen light and of the Coolidge tube has been recognised, we have been slow to realise that by utilising the radiance

and warmth of the ordinary electric lamp we may bring the dryness, the heat, and the light rays of the desert to promote healing.

The omission of dressings is an important factor in the success of the method. Crile believes that a great deal of discharge is due to the irritation of the dressings. The application of electric light in the treatment of wounds is simple. Electric lamps placed in pasteboard cones or in metal hoods are suspended from an adjustable frame, and can be used in treating wounds of the neck, chest, shoulder, arms, or legs. For abdominal wounds the lights may be suspended from a cradle. The amount of light and the proximity of the lamps must depend on the comfort of the patient.

Osteomyelitis.—A temporary pack is placed over the wound to prevent oozing. After a few hours the dressing is removed, and the wound is directly exposed to the rays from several electric lights suspended under a cradle. The bulbs should be near enough to the wound to cause a comfortable degree of warmth. Secretions from the wound are cleaned by Dakin's solution, and, if coagulated serum develops, a hot pack with Wright's hypertonic solution, applied for half an hour or more, cleans up the field. In some cases the radiant-light treatment is continued both night and day. Apart from the hot pack or Dakin's solution, no other dressing is used. Three advantages are claimed in cases of osteomyelitis for this method of treatment: the wounds heal rapidly; less dead bone appears; the amount of discharge is lessened.

Open Granulating Wounds.—Cases of skin grafting and all open granulating wounds repair more quickly under electric-light treatment.

Deep Drainage Cases.—In cases requiring drainage of the gall-bladder or appendix regions or of the pelvis, the exposure of the wound to electric light enhances the recovery of the case and adds to the patient's comfort.

Acute Infections.—In the treatment of acute infections of joints excellent results are obtained by combining continuous irrigation with Dakin's solution and exposure to a cluster of electric lights.

Aseptic Closed Wounds.—Observations made on a series of aseptic closed wounds proved that healing was as rapid when the wounds were left exposed, without dressings, to electric light as with ordinary methods of treatment, and that the patient was rendered much more comfortable.

MELANO-EPITHELIOMA.

Pathologists are divided in opinion as to the nature of the malignant pigmented neoplasms which occur in the skin and choroid. Most authorities regard the malignant growths associated with pigmented moles as sarcomata, basing their opinion on the belief that the component cells are derived originally from mesoblastic tissues.

Broders and MacCarthy (*Surg. Gynec. and Obstet.*, July 1916) report

their observations on a series of seventy cases, and their conclusions confirm the opinion of Norman Walker that the pigmented malignant tumours of the skin are epithelial in origin. The direct continuity of the spindle and oval cells, characteristic of pigmented tumours, can be demonstrated with the basal cells of the skin, not only in simple pigmented naevi, but also in the malignant growths referred to.

There still seems to be some doubt as to the exact origin of the pigmented cells of the choroid. Some authorities believe that they are a part of the embryonic optic bulb and others consider them a part of the mesoblastic tissue which lies adjacent to the retina.

Melanotic cancers of the skin arise either in naevi or from a hyperplasia of the basal layer of the skin. The subcutaneous tissue, glands, or distal organs are invaded by cells which may be either pigmented or non-pigmented, and which may be oval, spherical, or spindle-shaped. The cells may have an alveolar arrangement, but the authors have observed no evidence of any relation to vascular endothelium.

The condition is one of middle life, although it may be found from childhood to old age. The exact duration of the condition from its onset to a fatal termination is difficult to determine. While any part of the skin may be affected, the lower extremities were found to be most frequently involved.

The melanotic cancers arising in the skin are usually associated with spread to the regional lymphatic glands, and the mortality is a high one. The prognosis in the case of melanotic cancer or sarcoma of the eyeball is much less grave.

From a prophylactic standpoint pigmented warts or naevi should be removed when exposed to injury. The early diagnosis and removal of a melano-epithelioma along with the associated lymphatic glands is of the highest importance.

THE TREATMENT OF TETANUS BY MASSIVE AND REPEATED DOSES OF ANTI-TETANIC SERUM.

Bacri (*Bull. de l'Acad. de Méd.*, 24th October 1916) has treated thirteen cases of tetanus by the subcutaneous injection of large doses of the usual serum. The cases were unselected, and only five of the patients had had the benefit of a prophylactic injection.

The total amount of serum injected in the series of cases varied from 150 to 420 c.c. No symptoms of anaphylaxis or other complications due to the serum were observed.

The method followed was to inject subcutaneously one dose daily of 50 to 60 c.c. of anti-tetanic serum. Usually signs of improvement were observed on the third day after the commencement of the treatment. As all the patients recovered, the author believes that, when employed in the method described, anti-tetanic serum is specific and curative in cases of tetanus, as well as prophylactic when injected before symptoms have appeared.

J. M. G.

OBSTETRICS AND GYNECOLOGY.

UNDER THE CHARGE OF

A. H. F. BARBOUR, M.D., AND J. W. BALLANTYNE, M.D.

ROUTINE MICROSCOPICAL EXAMINATIONS IN GYNECOLOGICAL SURGERY.

DR. MAURICE J. GELPI (*Amer. Journ. Surg.*, September 1916, vol. xxx. pp. 277-283) emphasises, and rightly, the value of making a microscopical examination of all tissues extirpated in the course of routine gynecological surgery. The operator who carries out this plan will meet with many surprises and may suffer some chagrin, but he will attain to a higher degree of accuracy in diagnosis and record-keeping, his prognosis will be surer and his treatment more effective. The conclusions Dr. Gelpi has reached are founded upon the examination of some eight hundred pieces of tissue from seven hundred operations done in the New Orleans Charity Hospital. At times an accurate diagnosis could be made from the gross tissue alone, but in many cases it was found to be impossible to arrive at certainty without the assistance of the microscope. Thus, in one instance the gross tissue seemed to point to an enlarged uterus with chronic metritis or fibrosis, but the microscope revealed a typical adenomyoma. In another case the diagnosis of incomplete abortion after curettage seemed secure, notwithstanding the patient's firm statement (she was a widow) that recent pregnancy was impossible: but the microscopical examination showed chorioepithelioma. The woman underwent an extensive Wertheim hysterectomy, and was still alive when last heard from. Another patient had a different experience: she was sixty years of age, suffered from a retroverted large and soft uterus, and complained of profuse leucorrhœa. Even after the uterus had been removed the absence of carcinoma could not be assured till a microscopic examination revealed the existence of nothing more than metritis. All the cases cited by Dr. Gelpi were interesting and instructive, but room can only be found here for one more. The gross evidence was entirely in favour of tubal tuberculosis in association with cervical carcinoma. The fimbriated tubal extremities were open, the tubes were much thickened and adherent, their entire surface was studded with discrete, rather hard, "miliary tubercles," and cheesy material exuded from them when they were squeezed. A few minutes at the microscope put it beyond doubt that the supposed "miliary tubercles" were discrete metastatic cancerous foci. In this relation one must never forget the simulation of cancer by tuberculosis and of tuberculosis by cancer: the microscope alone can decide in certain cases. The author is of opinion that routine microscopical examinations would also in the end tend to conservatism.

For instance, many ovaries now removed would be left alone, for the naked-eye appearances may seem to point much more to a diseased state than the microscopical ones.

PROPHYLACTIC INDUCTION OF LABOUR IN NORMAL PELVES.

Mr. Fourness Barrington (*Med. Journ. Australia*, September 1916, Year III., vol. ii. pp. 224-226) writes in favour of the induction of labour at term in women who tend to have post-mature labours, although their pelvic measurements may be normal. He gives the details of two cases in one of which labour was 42 days late, and in the other 25 days. In the former Cesarean section had to be performed, and the child, weighing $10\frac{1}{2}$ lbs., was saved, but in the latter the child, also weighing $10\frac{1}{2}$ lbs., was born dead after a difficult extraction with axis-traction forceps. In both instances the foetal head was unduly ossified, and in the second the woman's pelvic floor was extensively damaged. In these, and in such cases as these, Barrington believes labour should be induced, and he gives details of a patient upon whom he put the plan into practice. She was a i.-para of 35 years, and her pelvic diameters were normal; she was seen and examined on the day when labour was regarded as due, and the head, large and hard, was found fixed in the pelvic brim. The next day labour was induced and delivery was with difficulty effected by means of axis-traction forceps. The child weighed 9 lbs., was resuscitated with difficulty, and the pelvic floor, which was damaged, was repaired. Barrington is quite sure that if the onset of labour had been delayed a week a live child could not have been pulled through the pelvis. The labour was induced by the insertion of a bougie. The conclusions reached are that the prevention of post-maturity diminishes greatly the morbidity and mortality to both mother and child; that it lessens the frequency and severity of operative interference; that it diminishes the risk of septic infection and of undue damage to the pelvic floor; and that it will not be often required (he has done it nine times in ten years). "A first labour is a trial trip; the carrying out of this maturity-induction makes the trip easier. . . . A little woman who marries a man with a large head is always looked on with suspicion. The paternal head is apt to be handed on to the progeny." The opinion is stated that seven days' licence should be granted all primiparae under thirty, and that if labour does not then occur spontaneously it should be induced. A primipara over thirty years, however, encounters greater risks than a younger woman, and these risks steadily increase as age advances; therefore, the seven days' licence is not given in primiparae over thirty. Of course, much of the success from interference will depend upon careful determination of the maturity of the child; and measurement of the head by the Paulik and other grips, and of the height of the fundus by the tape, will be very useful.

LABOUR WITH THE OCCIPUT POSTERIOR.

Dr. E. D. Plass (*Johns Hopkins Hosp. Bull.*, 1916, vol. xxvii. pp. 164-177) has made a special study of 635 labours in which the occiput lay posterior. These occurred among 5488 vertex presentations in the obstetrical ward of the Johns Hopkins Hospital up to November 1915. Their incidence, therefore, was 11·57 per cent., which is rather lower than that usually given, possibly because the majority of the patients applied for admission only after the labour was well advanced, and consequently a certain amount of internal rotation accomplished. The L.O.P. and the R.O.P. respectively gave 3·30 and 7·96, whilst there were 12·86 per cent. of L.O.T. and 8·89 per cent. of R.O.T. cases which may have been oblique positions to begin with. The directly O.P. cases were only 17, or 0·31 per cent. The L.O.A. and R.O.A. positions were respectively 47·61 and 19·06 per cent. In several of his conclusions Dr. Plass does not agree with the findings commonly met with in the text-books. Spontaneous rotation into the hollow of the sacrum occurred in 14·2 per cent., and the three factors which seemed to favour backward rotation were poor flexion, small size of the head, and the funnel-shaped pelvis. Contraction of the pelvic inlet, on the other hand, favoured anterior rotation. No strong opinion is hazarded regarding the cause or causes of internal rotation, but it is stated that Hodge's theory of the inclined planes and ischial spines is attractive, and has the merit of accommodating itself to the three favouring factors named above. Possibly no one theory satisfies all the demands made upon it. Another conclusion is that premature rupture of the membranes is not especially frequent when the occiput turns backward. Premature rupture, *i.e.* rupture before the os was more than half dilated, occurred in 21·8 per cent. Spontaneous delivery is the usual outcome. The total operative incidence, indeed, was 22·9 per cent., but in only 11·02 per cent. was the position possibly accountable for the need of intervention. Of the 146 cases in which operative assistance was called for, 39 consisted of version, 7 of Caesarean section (abdominal), and the rest of forceps (high, mid, or low). It is startling to find Dr. Plass saying there was no increased infant mortality because of the posterior position. The gross infant mortality, including all children in the series which were still-born or died during the first two weeks, was 52, or 8·17 per cent.; but 24 of these weighed less than 2500 grammes and were probably premature, so that there were only 28 deaths of mature infants, or 4·96 per cent., and of these only 16 (2·83 per cent.) could be said to be due to the position. The 16 included the deaths due to operation (11) and those due to asphyxia (5). Another startling finding is that labour is not prolonged, independently of whether the occiput rotates into the hollow of the sacrum or to the symphysis. A contracted pelvis does not increase the incidence of the

posterior positions. Finally, there is no additional maternal morbidity or mortality. There were, it is true, 10 deaths in the series, but it is claimed that none of them could be attributed to the position—4 were due to eclampsia, 2 to nephritis, 1 to diabetic coma, 1 to toxæmia and myocarditis, 1 to lobar pneumonia, and 1 to hæmorrhage (complete placenta prævia). In this connection it is particularly interesting to find the author stating that the chief point in the treatment is to give Nature a chance. "We view," he writes, "these cases with equanimity, and in consequence the patient is treated exactly as if there was any other uncomplicated vertex presentation." Again: "No attempt is made to correct improper flexion or to rotate the occiput forward; the spontaneous cases are, of course, simple. If the occiput has rotated into the hollow of the sacrum it is permitted to be born as such." Dr. Plass does admit that there is probably a greater possibility of perineal lacerations, "but these are never extensive enough to be of serious moment." There are many other statements in this article which obstetricians will do well to study and contrast with their own experiences; look at it as one may, it certainly contains food for thought.

THE WASSERMANN REACTION IN OBSTETRICS AND GYNECOLOGY.

Drs. Philip F. Williams and John A. Kolmer have made an interesting study of the Wassermann reactions of 300 gynecological and obstetrical patients (*Amer. Journ. Obstet.*, October 1916, vol. lxxiv. pp. 638-652). They have found the percentage of positive reactions (22·6) to correspond closely with the generally accepted incidence of syphilis in adults. The disease cannot be excluded on the basis of a negative history and the absence of demonstrable evidences of syphilis; and while a particular lesion may not be syphilitic, it is, however, highly important to institute antiluetic treatment if syphilis is demonstrated by the Wassermann test. The Wassermann reaction also has shed new light upon the interpretation of Colles' law. We now know that the majority of mothers of syphilitic infants show positive reactions and are really latent syphilitics; and, it is added, in not a few instances tertiary lesions have been known to develop at a later date. So, too, with instances of Profeta's law, which the reaction has shown to be often a case of retarded congenital syphilis. To sum up, say these authors, "most examples of so-called immunity in syphilis in mother (Colles' law) and child (Profeta's law) are due to the actual presence of spirochaetes in the tissues and are really latent infections." Further, the writers draw attention to the relatively high percentage of positive reactions observed in the following conditions: stillbirths, 75 per cent.; rectal diseases, 50 per cent.; amenorrhœa, 50 per cent.; habitual abortion, 50 per cent.; pelvic inflammatory disease, 36 per cent.; sterility, 33 per cent.; abortion and miscarriage, 29 per cent.;

metrorrhagia, 20 per cent.; myomata of the uterus, 16 per cent.; gonorrhoeal vaginitis, 10 per cent.; and pregnancy, 17 per cent. It is not, however, the intention of the patient always to deceive: the primary lesion in women is often overlooked, and the secondary stage may be disregarded. Obviously, more attention should be paid to syphilis as an etiological factor in the production of pelvic pathology than is usually done. Whether the Wassermann test should be made a routine procedure in gynecological and obstetrical practice is a more questionable conclusion.

J. W. B.

PATHOLOGY.

UNDER THE CHARGE OF

THEODORE SHENNAN, M.D., AND JAMES MILLER, M.D.

THE PROPHYLACTIC TREATMENT OF TETANUS WITH SERUM.

It was commonly said of the two diseases tetanus and diphtheria that from a bacteriological and pathological standpoint they were comparable in many respects. They were both caused by a poison emanating from an organism which remained localised at the point of infection, the poison, however, passing into the body and attacking the nervous system. Both were treated by an antitoxin prepared in the same way, but whereas the diphtheria antitoxin treatment was followed by brilliant results the same could not be said for the treatment with tetanus antitoxin. It was too often forgotten that the resemblances between the two conditions were superficial and their divergences deep-seated, the most striking and important difference being that the diphtheria bacillus is locally pathogenic and declares itself by its effects upon the pharynx, while the tetanus organism occurs in a wound along with other germs and manifests its presence only when its poison has reached and has fixed itself in the central nervous system. Thus treatment with antitoxin was begun in the case of diphtheria as soon as the sore throat commenced, while in the case of tetanus, treatment was resorted to only when the spasms began in the muscles—when the poison was acting on the central nervous system and was already fixed in the motor cells. The employment of prophylactic doses of tetanus antitoxin has altered all this to a considerable extent. By flooding the patient's body fluids with antitoxin soon after the wound has been received but before any symptoms have developed, the tetanus toxin is neutralised as it slowly makes its way up the nerve trunk towards the central nervous system.

The contrast between medical and surgical conditions in the present war and those in the South African campaign is marked in several respects. Typhoid fever accounted for the large proportion of cases of

severe illness in South Africa, whereas in the present war enteric is, on the western front, a rare disease. The experience gained in South Africa regarding perforating wounds of the abdomen was to leave them alone. The present war had not been long in progress before it was realised that such cases should be operated on as soon as possible. Tetanus as a complication of wounds was almost unknown in South Africa. In the present war, on the western front, during the early stages, it was a very serious and common condition. This was partly due to the increased number of wounds caused by fragments of shell, grenades, and shrapnel as compared with South Africa, partly to the nature of the soil which might gain entrance to the wound. On the Karoo the earth was relatively uncontaminated by dung and was exposed to the rays of a powerful sun. In Flanders the soil is highly cultivated and therefore swarms with tetanus spores. MacConkey (*Brit. Med. Journ.*, 11th December 1915), in an analysis of the statistics of tetanus during the present war, shows that out of a series of 83,593 wounded (German, French, British) 539, or 0·65 per cent., developed tetanus. Comparison of these figures with the Crimean War (British), 0·15 per cent., the American Civil War, 0·2 per cent., Franco-Prussian War (German), 0·36 per cent., and the Russo-Turkish War (Russian), 0·12 per cent., shows that the number of cases in the present war has been out of all proportion to what might have been expected. MacConkey's statistics refer to the earlier stage of the war. If statistics were gathered of the wounded during the last year undoubtedly the results would be different. This difference has been due to the systematic administration of prophylactic doses of antitoxin. As examples of the results the following may be given:—Hartmann (1914) met with 43 cases of tetanus among 3373 wounded. Not one case occurred in men who had received doses of antitoxin. Hufnagel (1914) reports 27 cases of tetanus among 2193 wounded at Namur between 11th September and 30th November. After 15th October every case admitted received a prophylactic injection of antitoxin, and of the 1195 men none developed tetanus. Bazy (1915) gives an account of 200 wounded who were divided into two groups of 100 each approximately of equal severity. One group received prophylactic injections of antitoxin, and among them there occurred one case of tetanus which developed the day after the inoculation. The other group received no injections, and there were 18 cases of tetanus amongst them. Summarising the cases up to date (December 1915), MacConkey gives a series of 1881 published cases treated with prophylactic injections, with 5 cases of tetanus, or 0·26 per cent. Recent statistics regarding the value of antitoxin in preventing tetanus as a result of the 4th of July celebrations in America are given in the *Journal of the American Medical Association*, 1915, No. 26. The number of deaths from tetanus fell from 417 in 1903 to 150 in 1909 and 3 in 1914, a reduction "far

out of proportion to the reduction in the number of accidents from which tetanus might have resulted."

As regards the dosage of antitoxin for prophylactic purposes opinions vary very much. The unit which is generally employed now is the U.S.A. unit. This represents ten times the least quantity of serum which is required to preserve the life of a 350-gramme guinea-pig for ninety-six hours when mixed with the official test-quantity of standard toxin (100 minimum lethal doses) and injected subcutaneously. Commercial sera usually contain 1500 U.S.A. units in a volume of 10 to 15 c.c. (Browning, *British Journal of Surgery*, 1916, vol. iv. No. 13). The Revised Memorandum (1916) issued by the War Office Committee on Tetanus states that the primary injection should consist of 500 U.S.A. units, and the second and following injections should be of the same amount. The larger proportion of the German authorities advocate 800 U.S.A. units, although Aschoff gives as much as 4000 units for the first dose. The usual prophylactic dose of 10 c.c. of Pasteur Institute serum is stated by MacConkey to be equal to some 600 U.S.A. units. The War Office Memorandum states that the first injection should be given at a dressing station or field ambulance as soon as the wounded soldier is removed from the firing line. The second and following injections are usually given at home hospitals. MacConkey concludes that "war experience confirms the pre-war conclusion, and it may be accepted that from 500 to 1000 U.S.A. units of tetanus antitoxin is a sufficiently large prophylactic dose for the great majority of injuries, provided it is given early," but "as the amount of soiling of the wound and contusion of the tissues increases so should the amount of antitoxin be increased."

As regards the route of introduction there are one or two interesting points dealing with experimental tetanus which require consideration. Tetanus in small animals is of the ascending type; *i.e.* the spasm begins, as a rule, in the muscles of the inoculated limb and spreads later on to the rest of the body. With a small dose of toxin, spasm may remain confined to the inoculated limb. The muscular spasm of ascending tetanus is due to the action of the toxin on the related segment of the spinal cord, the toxin reaching the cord by passing up the muscular nerve. The following experiments demonstrate this (Browning, *loc. cit.*):—Taking advantage of the fact that tetanus toxin when injected into the muscle soon reaches the nerve supplying the muscle, and when in the nerve is practically insusceptible to the neutralising action of antitoxin contained in the blood and lymph, a rabbit is passively immunised by an intravenous injection of antitoxin, which soon reaches the lymph, and then receives a relatively small dose of tetanus toxin into the muscles of the hind leg; the result is that local tetanus develops in the inoculated limb and nowhere else. The same result follows if antitoxin is injected into the thigh muscles and toxin is

introduced into the sciatic nerve at the same spot. But if in such a passively immunised animal the sciatic nerve be first cut below the gluteus maximus, and then toxin be injected into the peripheral end, no tetanus occurs. Subcutaneous injection of toxin produces no effect in a passively immunised animal.

The rate of ascent of toxin in the muscular nerve may be judged from the following experiment:—A series of rabbits are immunised intravenously with antitoxin, and then several times the lethal dose of toxin is injected into the leg muscles; at varying times thereafter, in different animals, the sciatic nerve on the same side is cut. It is found that if an interval of five hours or more is allowed to elapse between the injection of the toxin and the neurotomy, local tetanus develops.

If the posterior nerve roots only of one leg are cut, and then later on, after the animal has been passively immunised intravenously, toxin is injected into the muscle of the neurotomised leg, no tetanus follows; a similar injection on the sound side causes spasm as usual.

If antitoxin is injected into the sciatic nerve, and then toxin is immediately injected into the corresponding limb, tetanus fails to occur in that limb. The intraspinal injection of antitoxin also prevents ascending tetanus.

The actual mode of conduction in the muscular nerve has not been determined. Some consider that it is the axis cylinder which forms the path of conduction, others state that it is the neural lymphatics. The nerves do not bind the toxin. The toxin is fixed in the central nervous system, notably in the grey matter. When the toxin reaches the spinal cord it spreads.

Tetanus in man, the horse, and other large animals is of the descending type, beginning usually in the masseters, whatever the site of the infected wound may be; subsequently the affection spreads to other muscular groups. It is doubtful whether the toxin spreads by the muscular nerves or reaches the cord by means of the blood. It is difficult to explain the early appearance of spasm in the masseters on any theory. While this descending type is the one most usually met with in the human subject, a number of cases have now been described of tetanus commencing in the wounded limb and either spreading to the rest of the body or remaining localised. These are cases in which antitoxin was administered during the incubation period, but too late to prevent altogether the outbreak of tetanus.

From the above considerations it is clear that the sooner the body fluids are flooded with tetanus antitoxin in the case of a wound infected with tetanus the better will be the results. Moreover, MacConkey has shown that two thousand times as much serum is required to save the life of an animal when injected 24 hours after the toxin. The route of introduction of the antitoxin is of importance. Introduced subcutaneously it takes about 48 hours for the antitoxin to diffuse itself.

If injected into a muscle the period is considerably shortened (probably 12 hours). Intravenous administration causes a much more rapid diffusion, and would probably prevent tetanus in some cases in which subcutaneous injections fail. Intrathecal injections, *i.e.* injections into the subdural space after lumbar puncture, ensure that the antitoxin reaches the central nervous system, and for curative purposes is undoubtedly the method to be preferred. In the routine use of antitoxin for prophylactic purposes the subcutaneous or intramuscular method is sufficient. In severely lacerated and infected wounds the intravenous method is to be preferred.

As regards the duration of the immunity conferred by inoculations of this kind, probably both in man and in animals, a week is all that can be regarded as the period of protection. Hence the insistence of the War Office Memorandum that second injections should follow the first at an interval of seven days. In cases of long-continued septic wounds, particularly those caused by shell or bomb, third and fourth injections at seven-day intervals are recommended.

Cases of delayed tetanus are sometimes noted when operations are performed upon wounds inflicted some time previously. This is due to the breaking down of the granulation tissue barrier which takes place under these circumstances. Hence the War Office instruction that "when operations are performed at the site of wounds, even if they are healed, a prophylactic injection of serum should invariably be given if the operation be performed at a greater interval than seven days from the last injection. Cases have occurred in which the performance of simple operations has been followed by an attack of tetanus, although in many cases the primary wound had been healed several weeks before the operation. This precautionary injection may consist of a single subcutaneous injection of the ordinary prophylactic dose of 500 units, given, when possible, two days before the operation."

The War Office Memorandum also states that "It may be definitely stated here that the danger of anaphylactic shock is negligible when prophylactic doses of 500 U.S.A. units contained in 3 c.cm. of horse serum are given subcutaneously, whatever the interval after the preceding injection." Browning states that if a patient has received a previous injection of antitoxin ten days or more previously, he should not receive a further massive dose of serum intravenously or intraspinally without previous preparation to induce anti-anaphylaxis. Anti-anaphylaxis may be induced rapidly by introducing diluted serum in small amounts at intervals of a few minutes according to the method of Besredka. Another method is to give a small dose of serum subcutaneously the day before a larger dose is given. But, as stated in the War Office Memorandum, when dealing with the relatively small dose of horse serum involved in giving 500 U.S.A. units, this danger is negligible. This is probably due to the fact that man is not a very anaphylactic animal.

J. M.

THERAPEUTICS.

UNDER THE CHARGE OF

JOHN EASON, M.D.

THE USE OF EMETINE.

ALTHOUGH ipecacuanha was introduced into Europe from Brazil in 1648, and a mixture of alkaloids was isolated in 1817 by Pelletier and named by him emetine, it was not until within a comparatively few months ago that pure emetine has been prepared. Practically all of the emetine used, and even now available, is impure and has been shown to have a dangerous variation in activity and toxicity. In spite of peculiar technical difficulties refined methods of analysis have now produced a pure emetine which, so far, has not been thoroughly studied in either the clinic or the laboratory. The earlier emetine was a mixture of emetine and cephæline, and the emetine of ordinary use has been shown by Hesse to contain a cephæline-like body. According to Hesse, pure emetine has no emetic properties, and only contamination with some of the other four alkaloids of ipecacuanha makes it emetic.

Emetine hydrobromide is considerably easier to purify than the hydrochloride. The latter is specially hard to separate from ipecamine hydrochloride. Reed (*Boston Med. Journ.*, vol. clxxv. No. 11, p. 375) therefore recommends the hydrobromide as the preparation of choice. Against its clinical use, however, is its difficult solubility. The chief danger of emetine is its contamination with the strongly toxic cephæline.

Emetine has the general properties of alkaloids, being soluble in alcohol, ether, and chloroform, and but sparingly soluble in water. Emetine hydrochloride is slowly soluble in cold water, forming a saturated solution of about 13 per cent. at 18° C. It is the most soluble of all the emetine salts.

There is practically no literature available on the action of emetine as obtained in the pure form by the Hesse method. All data refer to the purest emetine to be had at the time commercially, and this has recently been proved by Levy and Rowntree to vary in toxicity and action within comparatively wide limits, according to the methods of manufacture of the various purveying firms (*Arch. Int. Med.*, 15th March 1916). Standardisation of emetine preparations is urgently required.

In view of what has just been stated it seems probable that future experiments with pure emetine will lead to some amendments of present opinions regarding its actions.

The local action of emetine consists in a profound irritation of all

contiguous tissues, which is at first inflammatory, and later goes on to ulceration and necrosis. Inhalation of the powder of ipecacuanha causes the so-called emetine asthma from the local irritation produced. Subcutaneously also it produces a marked irritation, with pain, swelling, stiffness of the part, ulceration, and sometimes necrosis.

Emetine has been shown to have a depressing action on the heart and circulation. A single large dose shows no effect, but repeated small hypodermic doses produce a serious fall of blood-pressure in animals, with a small fast pulse. This is a symptom of poisoning, and may not be elicited in the therapeutic use of the drug. Various observers have noted a peculiar cardiac irregularity, shown to be due to a coarse ventricular fibrillation. This is at first generalised, then the auricle ceases to beat, becomes engorged, and dilates. The heart stops in diastole synchronously with respiratory failure. In some cases the normal rhythm is resumed after a temporary period of fibrillation. Cutting the vagi does not influence this action of the drug upon the heart.

Cephaeline has a more profound influence on the blood-pressure than emetine, but the latter is more toxic to the heart itself. Death in emetine poisoning comes from cardiac failure.

On the gastro-intestinal tract emetine seems to act as a general irritant, producing vomiting and diarrhoea when the dose is sufficient. Anorexia, gastric distress, and headache occur. As already stated, Hesse claims that pure emetine has no emetic action, and that the alkaloid is therefore misnamed, its emetic properties being due to an admixture of cephaeline. But the consensus of opinion is to the effect that emetine, hitherto in use, does act as an emetic. The ordinary preparations certainly have a marked emetic action when given by the mouth. Unless when toxic amounts are given, emesis seems to be invoked only when the alkaloid is given by the mouth. It has not been definitely determined whether there is an interrelation between the emetic action and the effect on the circulation, particularly on the blood-pressure. The action of emetine on the respiratory tract is probably secondary to a mild degree of nausea.

An observation of Howell is to the effect that the blood of emetine-poisoned animals clots with unusual slowness. The clot is non-retractile, soft, and of a jelly-like consistence, showing no visible structure under the ultra-microscope. No marked change is produced in renal function until the terminal stage of poisoning.

The action of emetine as an amoebicide was demonstrated by Vedder, and is the basis of its employment in amoebic infections. It destroys the vegetating amoebae, but seems not to affect cysts. Practically, the symptoms of the action of the drug are in reality by-products which are unnecessary, or even undesirable, in its therapeutic administration. There are exceptions to this general statement. It

has been claimed that emetine stimulates the vomiting centre in the medulla, but the observation is not well substantiated.

Diarrhœa, with blood, mucus, and much pain and tenesmus, may occur after the use of emetine hypodermically, and the mechanism of its production is not clear. The manner of excretion of emetine has not been determined. The difficulty of recognising these poisonous intestinal symptoms is greatest in the condition where, above all others, the use of emetine is important—amœbic dysentery. Here, not infrequently, the diarrhœa from emetine is confused with the amœbic diarrhœa, and the drug is continued, or increased to a dangerous degree. It should be noted by practitioners that there is sometimes an idiosyncrasy to emetine. This may exhibit itself in an exaggerated local reaction to the hypodermic injection, with extreme pain, swelling, erythema locally, and stiffness lasting for several days. It is, of course, remembered that certain individuals are so sensitive to ipecacuanha that a jar opened at a distance of several feet will produce violent sneezing and discomfort. In consequence of the local reaction above referred to, Low has recommended intramuscular in preference to hypodermic injection.

Many observers have noted that emetine poisoning gives a clinical picture indistinguishable from acute beriberi. Levy and Rowntree have collected 20 reported cases of poisoning, in 12 of which peripheral neuritis of varying degree was a prominent symptom. The evidence is not entirely convincing, as the cases appear to have occurred in beriberi districts. It is possible that emetine may have been an exciting cause.

A. R. Kilgore, in the same number of the *Boston Medical and Surgical Journal*, also discusses this supposed action of emetine, but as his paper also deals with matters as they are in China we are led no nearer to a solution of this question. His observations merely confirm others recently made, that large or repeated doses of emetine, as given in those districts, are not infrequently associated with various manifestations of peripheral neuritis. Although there is no experimental evidence to show that emetine in large doses gives rise to neuritis in animals, the mode of onset of the neuritis clinically suggests that the emetine has been the determining factor in its occurrence. Further investigation is required on this important matter.

From what has been said it is apparent that emetine has dangerous potentialities, and that the utmost caution is necessary in its clinical use. There is also increasing evidence that the emetine so far available is not a pure alkaloid, and as supplied commercially has a dangerous variation in toxicity.

Obviously, therefore, the question of dosage is of great importance; and in view of the varying toxicity of commercial emetine it is natural that opinions should vary. Usually the dose for an adult should not

exceed 1 gr. in one daily hypodermic injection. After a course lasting for six to eight days an interval of one week should elapse, and then two-thirds of the previous number of injections in the same dosage should be administered. Children show a relative tolerance for the drug. For oral infections $\frac{1}{2}$ gr. daily for three to six days is recommended. If too small doses are used the amœbæ may become immunised without being destroyed. In fulminating cases intravenous injections may be required, in which case $\frac{1}{2}$ gr. in a large diluent of saline should be the standard dose.

In using emetine in dysentery it appears that if there is to be benefit, it will usually show by the third or fourth day. Emetine seems specific in direct proportion to the acuteness of the attack. Chronic dysentery and amœba carriers, as a rule, are uninfluenced by emetine directly, but the most recent observations on this point are more favourable. Low (*Journ. Trop. Med. and Hyg.*, 1st February 1916) has published good results in two cases of amœba carriers. Numerous cysts of *entamoeba histolytica* were present. These gradually decreased in number under persistent treatment, and finally disappeared. Low compares the action of emetine on the amœbic cysts to that of quinine on subtertian crescents. Both are resistant to the drug. Continued administration destroys the successive crops of vegetative forms in each case, and thus gradually decreases the number of cysts and crescents respectively, and eventually eliminates the infection. Further work just recorded by Dobell furnishes an even more favourable prospect for the efficient treatment of amœba carriers. This subject is dealt with later. Emetine has also a very definite use in the presuppurative stage of tropical abscess of the liver, especially when this follows directly on an acute dysentery. After actual abscess formation the condition becomes surgical, although even then emetine is a valuable adjuvant, particularly if the abscess has ruptured and spread amœbæ through the contiguous tissues.

Reference has already been made in this *Journal* to the action of emetine on amœbic pyorrhœa.

The form of emetine at present in general use is, as already stated, contaminated with cephæline or ipecamine. It is probably the latter substances which produce the nausea and consequent flow of bronchial secretion which have led to the therapeutic application of ipecacuanha in bronchitis. It is extremely doubtful if the pure alkaloid emetine will serve so well as the old impure form. The older Galenical preparations would also seem to have certain definite advantages over emetine itself for this purpose.

In French medical journals, more particularly, emetine has been regarded very highly—almost as a specific—in the treatment of hæmorrhage, especially for hæmoptysis in pulmonary tuberculosis. Some have advocated its use as a remedy for hæmorrhage in typhoid,

diabetes and other conditions. There is no experimental basis for the belief that emetine has the slightest influence on hæmorrhage directly, or that under any circumstances it promotes coagulation. An observation already mentioned, viz. that the blood is modified in the opposite direction, is probably more to be trusted than the clinical evidence of its value in a condition which usually terminates spontaneously. In so far as emetine may have a beneficial action in hæmorrhage it is probably an indirect result of diminished blood-pressure, and, if so, other drugs would be more effective, in that they would produce a similar result more safely and without the specific action of emetine on coagulation.

Mr. Clifford Dobell has just reported to the Medical Research Committee (*Brit. Med. Journ.*, 4th November 1916, p. 612) the results obtained at Walton Hospital in the treatment of entamœba infections by various emetine preparations. The observations deserve careful study. In a first series of 21 cases treated hypodermically with emetine hydrochloride it was found that 14 had not been cured of their infection after 11 to 14 grs. had been administered. The remaining 7 cases were discharged as cured on the evidence of numerous examinations of the stools. Of the 14 cases which were not cured by emetine hydrochloride, 5 showed no improvement whatever, and were found to be passing cysts of *E. histolytica* every time they were examined, both during and after treatment. The other 9 uncured cases passed no cysts or amœbæ for some time during or immediately after treatment. They then relapsed at varying intervals of time after treatment. The facts clearly show that negative examinations made during and immediately after treatment cannot be relied upon as an indication that a cure has been effected. On a system which requires only three consecutive negative examinations to establish a "cure," at least 5 of the infected cases could have been discharged as cured. Whether all the seven cases which were discharged as "cured" under a more searching system are really freed from infection remains, says Dobell, open to doubt. What is quite certain is that 66·6 per cent. of the cases treated with emetine hydrochloride were definitely not cured. A second series of 14 cases unsuccessfully treated with the hydrochloride were made the subjects of a test with emetine bismuth iodide. Eleven were given this preparation and three were again given the hydrochloride so that they constituted a control.

The double iodide of emetine and bismuth, which is given by the mouth, on a full stomach, was administered in cachets containing 1 gr. each, thrice daily, until 36 grs. had been taken. In a few cases the daily dosage was reduced on account of the vomiting which was produced. It appears, as the result of further experience, that it is best to persist with the drug in full doses, as tolerance is usually established in a couple of days. All the cases suffered more or less from diarrhœa during treatment. In all cases this ceased after the treatment was

stopped. This effect of the drug was probably beneficial in eliminating the amœbæ and preventing the accumulation of faecal matter in healing ulcers. The results of treatment with emetine bismuth iodide *far surpassed the most sanguine expectations*. Every case became negative (ceased to pass cysts or amœbæ) within a few days, and all remained negative for as long as examinations were made. These examinations were made with more than the necessary routine care, and in one or two cases for seven and eight weeks. The controls which had previously resisted hydrochloride treatment again made little or no improvement when again submitted to the same treatment. This has to be compared with the 11 more or less certain "cures" under emetine bismuth iodide. Two of the three uncured control cases have now, after resisting two full courses of the hydrochloride, been freed of infection by a single course of the double iodide of bismuth and emetine. The third case has unfortunately been lost sight of. The results obtained by Jepps with the hydrochloride of emetine injections largely confirm Dobell's. Jepps (*Brit. Med. Journ.*, 4th November 1916, p. 616) found that of 21 cases treated by hydrochloride of emetine injections 57 per cent. were certainly not permanently freed from *E. histolytica* after the administration of at least 10 grs.

In the light of the observations of Dobell and of Jepps the conclusion recently stated by J. G. Thomson and D. Thomson (*Journ. R.A.M.C.*, June 1916) on the effectiveness of emetine hydrochloride appears to be unduly optimistic. Thus they state that if an amœbic case receives a course of treatment with emetine hydrochloride of not less than a total of 7 to 10 grs. of the drug, administered in grain doses daily for a week, it is probable that he will never become a carrier of cysts. In order, however, to make certain of this, it is better to carry the treatment further.

It appears that Dobell has not only demonstrated the great superiority of the double iodide of emetine over the hydrochloride, but that there are acute cases which are practically incurable with the hypodermic treatment which can nevertheless be quickly cured with the double iodide. The action appears to be a specific one, as the other protozoa of the bowel are not harmed. *Acute dysentery, contact carriers* and ordinary *convalescent carriers* all respond to the treatment.

NEW BOOKS.

The Endocrine Organs. By Sir EDWARD A. SCHAFER, LL.D., D.Sc., M.D., F.R.S. Pp. ix. + 156. London: Longmans, Green & Co. 1916. Price 10s. 6d. net.

THIS volume is founded on the Lane medical lectures delivered by the author in 1913. They are now amplified and illustrated with tracings and diagrams and make a most attractive volume. The author seeks to apply the term "autocoid" to a specific organic substance formed by the cells of one organ, and, when passed into the circulation, capable of influencing the function of another organ. These autocoids may have a stimulating effect (hormones) or an inhibitory effect (chalones).

The development and histological structure of the various endocrine organs are described. The verdict passed on the various functions which have been ascribed to the parathyroids is the only safe one—that of not proven.

The author, however, inclines to the view that their function is independent of that of the thyroid. There is a reference to accessory thyroids in the neck and anterior mediastinum, but they may occur elsewhere, and have been met with in the submaxillary region and in the nose. The thymus is briefly but adequately dealt with. Its relationship to status lymphaticus is mentioned, but there is no reference to thymus death. The explanation of that extraordinary phenomenon is unknown, but we think the author would at least have mentioned it if he had ever had the fortune (or misfortune) to meet with a case.

The suprarenals and pituitary are very fully discussed, and their action is illustrated by some beautiful tracings. We do not share the author's assurance that a second dose of pituitary extract has no effect on blood-pressure, or may cause a fall. This certainly may occur; but we have just as often seen the first effect repeated after a second, third, or even fourth injection. The pineal is regarded as still *sub judice*. Secretions are discussed, and the book closes with an account of the internal secretions of the reproductive organs.

The Problems of Physiological and Pathological Chemistry and of Metabolism. By Dr. OTTO VON FURTH. Translated by ALLEN J. SMITH. Pp. xv. + 667. Philadelphia and London: J. B. Lippincott Co. 1916. Price 25s. net.

THIS is an interesting and readable account of a difficult subject. It contains a full account of the chemistry of digestion and of ferment

action. It discusses the formation of urea and purins, and the significance of the amino acids. There are several chapters dealing with the metabolism of fats and carbohydrates and with diabetes. Nutritional requirements, gas exchange, tissue respiration, and fever are also discussed. Descriptions of laboratory methods are omitted. While much of the discussion is necessarily very technical, the book has much in it to appeal to the reader who is unable to follow all its flights into the higher chemistry.

The broad and careful lines upon which it is written are illustrated by the following quotations :—" However much the author realises the importance of hypothesis towards future discovery, he feels that in this case (elimination of amino acids) the metabolic chemist has every reason for keeping close to the fundamental facts lest he risk loss of all the footing on which he stands."

"The author has never quite grasped why scientists so often burden life with insistence upon definitions of things whose real nature they themselves are unable to sharply and clearly depict."

After insisting that the onus of proving an hypothesis lies with its proposer, and that there is no obligation on the critic to disprove it, the author quotes the following verse, which will bear repetition :—

Oh, learned man, 'tis thus I know you face to face !
What you don't touch stands miles from you apace ;
What you don't grasp, for you is gone for woe and weal ;
What you don't see, you're sure cannot be real ;
What you don't weigh, ne'er has a weight for you ;
What you don't coin, you think don't count a sou.

There are numerous references to literature and we can heartily commend the book.

When to Advise Operation in General Practice. By A. RENDLE SHORT, M.D., B.S., B.Sc.(Lond.), F.R.C.S.(Eng.). Pp. 279. Bristol : John Wright & Sons, Ltd. 1916. Price 5s. net.

As the title indicates, this book is written for the general practitioner, and there can be no doubt that it meets a felt want. The field is large because, owing to the advances made in diagnosis and treatment by specialists, the busy practitioner meets every day with cases, the proper treatment of which depends on the knowledge and skill of the specialist.

The author rightly includes in his list of cases not only emergencies in which the delay of a day or even a few hours may entail disaster, but also those insidious and chronic cases in which a cancer is apt to be overlooked until it has become inoperable, or some other condition, remediable safely by operation at an early stage, is allowed to

undermine the patient's strength till the risk of an operation is too great to be recommended.

A great deal of valuable information is furnished by Mr. Short with regard to such cases, and he might with advantage have made the list even more comprehensive. Guidance, for instance, might have been offered in the treatment of certain injuries of the eye, where enucleation of the injured eye may save the sight of the other one, or where a timely iridectomy may arrest the progress of glaucoma, which would otherwise inevitably lead to blindness. Or, again, it seems a pity that the practitioner's attention is not directed to the dangers of a slowly developing empyema if left undrained.

In a future edition we would suggest that the chapter on the acute abdomen should include acute appendicitis as one of the possible conditions to be reckoned with. By selecting "acute appendicitis" as the subject of a chapter—the first—the author follows the lead of systematic text-books, but this method does not seem appropriate to the present enterprise. "In this chapter we shall assume that there is little or no doubt the diagnosis of acute appendicitis is correct"; but surely it is just on the subject of diagnosis that the general practitioner often most needs help. "Is it appendicitis, or is it colic?" is frequently his anxious question when summoned to the bedside of an "acute abdomen."

The "colics" are appropriately discussed as a subheading of the "acute abdomen"; but among the causes of severe colic, fæcal impaction in the proximal part of the great intestine might with advantage have been more adequately dealt with.

The author frequently refers to actual cases to illustrate his points in a manner which is both interesting and instructive.

The Bacteriology of Dysentery in Malaya. By HENRY FRASER, M.D. (Aberd.). Pp. 44. Singapore: Kelly & Walsh, Ltd. 1916. Price 3s. 6d. net.

AN important contribution to the investigation of the etiology of dysentery forms this latest issue of the "Studies from the Institute for Medical Research, Federated Malay States." Dr. Fraser's reputation as an accurate observer is further enhanced by the evidence which he embodies in this brochure. His investigations result in simplifying the classification of the bacilli of dysentery to two main groups: Shiga's bacillus and the mannite-fermenting dysentery bacilli. Some 800 cases provide the basis of the study, which concludes with a suggested treatment by sensitised or agglutinated vaccines.

The Basis of Symptoms. By Dr. LUDOLPH KREHL. Authorised Translation from the Seventh German Edition by ARTHUR FREDERICK BEIFELD, M.D. Pp. 517. Philadelphia and London: J. B. Lippincott Co. 1916. Price 21s. net.

THE sub-title of this work—*The Principles of Clinical Pathology*—gives a fair idea of its scope. It is a sort of enlarged compendium of the paragraphs on pathology which are found in the larger treatises on medicine. There are twelve chapters of unequal merit, one of the best being that on the circulation, the weakest being that on the blood. In the latter we read that there is no necessity for making a distinction between normal and pathological red marrow. The author makes no attempt to classify or distinguish the different leukæmias and lymphadenoma, and the result is a confused jumble. The word *proteid* is used throughout for *protein*. Emphasis is frequently indicated by extra spacing of the letters, with the annoying result that the reader has to hunt for the spaces between the words. The references are almost exclusively Teutonic. The translation appears to be well done; but on p. 352 we read "Certain diabetics are better equipped to *take care of* levulose . . . than dextro-rotatory carbohydrates." The book failed to arouse in us more than a placid interest, but we can commend it as a careful and conservative account of its subject.

The Institutional Care of the Insane in the United States and Canada.

Edited by H. M. HURD, M.D. Vol. II. Pp. 897. With 37 Illustrations. Baltimore: Johns Hopkins Press. 1916.

THIS is the second volume of a complete history of the care of the insane in the United States and Canada issued under the editorship of Dr. Hurd. The first volume was reviewed in the July number of this *Journal*. The present volume contains particulars of the various asylums and State hospitals in 24 of the United States, arranged alphabetically. The amount of space given to the different States varies very much, of course, as they are of very different ages. Amongst those dealt with in this volume, naturally the New England States figure most prominently, as they are the oldest. The first public reference to the insane was in Connecticut in the middle of the seventeenth century. The first State Act dealing with them was, however, not passed until 1694, in Massachusetts, and Connecticut followed with an almost identical Act in 1699. But these Acts did not provide for special institutions for their care and treatment, and it was not until more than a hundred years later that this step was taken. As in this country, these were first erected by private funds, and the institutions built by these means are the oldest in the country. Some of them have maintained their original status, but others, as in this

country also, combined their original purpose with State or local public requirements. Of these older asylums, M'Lean Hospital, Hartford Retreat, and Worcester Hospital are the best known. The detailed histories of these and other institutions form interesting reading. Views of many of the asylums form the majority of the illustrations; and it is interesting to note to how large an extent the system of having the asylum built in detached blocks prevails, especially in the newer asylums. Indeed, this system was in vogue in the States at a period considerably prior to its adoption in this country. The first State asylum built on the "cottage" plan was that at Kankakee, in 1880. It is to Dr. M'Farland of Illinois that the chief credit for the new departure must be given; but it took many years of agitation before his views found acceptance. The cottage or villa system has now many adherents, for, as already stated, many of the later asylums have adopted it for administrative and economic reasons. There is much information in the book about the laws in various States relating to the admission of patients to the hospitals, and the history of all the State asylums, as well as of the more important private institutions, is also given. It is a mine of facts and a most useful book of reference.

The Third Report of the Indigenous Drugs Committee. Pp. iv. + 377.
India: Calcutta Superintendent Government Printing. 1916.

WE do not think that the sciences of pharmacology and of therapeutics are likely to be materially advanced by the methods of obtaining reports on medicinal substances as exemplified in this report. And this is evidently the opinion of the committee itself, who feel that the work should form part of that of a Chair of Pharmacology in connection with the School for Tropical Medicine. This suggestion is most reasonable. The reports, which have been produced with much labour, are contradictory; the dosage employed is arbitrary and not sufficiently varied; inferences are drawn from insufficient observations; and statements are made with regard to the possessing of a pharmacological action, *e.g.* cholagogue, on the flimsiest evidence. The want of normal or control observations is evident on every page.

Rheum emodi is a good laxative, unreliable, and either does or does not cause griping.

Ixora coccinea alleviated the conditions in some cases of dysentery, and in the doses employed produced little or no effect in others.

Melia azadirachta is not as valuable as quinine for malaria, at least in the doses used, failing entirely in some cases.

Holarrhena antidysenterica is pronounced by three investigators as valuable, and by three as almost valueless.

Berberis lycium is of little value in malaria, and *Symplocos racemosa* of but doubtful value in diarrhoea and dysentery.

The Story of a Red Cross Unit in Serbia. By JAMES BERRY, B.S., F.R.C.S. ; F. MAY DICKINSON BERRY, M.D., B.S. ; and W. LYON BLEASE, LL.M. Pp. xvi. + 293. With 28 Illustrations. London : J. & A. Churchill. 1916. Price 6s. net.

THIS is a most fascinating story of the work accomplished by the Anglo-Serbian Hospital Unit during the fateful year spent with the Serbian Army. That year "was a strange mixture of tragedy, comedy, and pathos" to those who took part in the work of the Unit, and the authors have succeeded in reflecting these mixed elements in the record now before us. No one can read it without being deeply moved to sympathy with the Serbian people, or without feeling a glow of pride in the heroic deeds of our ally. To medical readers the chapter on "Typhus and how we dealt with it" will prove most interesting and instructive as the record of a concrete experiment in preventive medicine, carried out under the most difficult conditions with remarkable success. Mr. and Mrs. James Berry and their colleagues in the Unit are to be congratulated on the excellent work they accomplished at Vrnjatchka Banja, as well as on the manner in which they have recorded their experiences.

The Influence of Joy. By GEORGE VAN NESS DEARBORN. Pp. 223. London : William Heinemann. 1916. Price 5s. net.

THIS volume of the "Mind and Health Series" is stated by the author to be "an essay intended to set forth some of the hygienic and therapeutic sanctions of organic happiness. Some of its readers will find that it substantiates their belief, already firm, in the reality of joy's bodily influence; and a few of them may be originally convinced of it, those especially to whom 'cold facts' appeal; while still fewer may see in the endeavour a slight but sincere contribution to the science of the relationship of mind and body—the two glistening sides of our soul's shield."

The author enters into a considerable amount of physiological detail regarding the influence of the emotions on nutrition, the circulation, the nervous system, and the secretion of the ductless glands. Having shown, with great wealth of illustration and argument, that "happiness is strongly dynamogenic," the author devotes a brief concluding section of his work to some practical hints on the cultivation of happiness, and the means of avoiding worry, hurry, over-fatigue, fear, and other enemies of joy. The book is clearly written, and supplies a useful survey of recent scientific work on the influence of emotional states on the organs and processes of the body.

NEW EDITIONS.

A Surgical Handbook. By F. M. CAIRD and C. W. CATHCART.
Seventeenth Edition. Pp. 364. With 208 Illustrations.
London: Charles Griffin & Co., Ltd. 1916. Price 8s. 6d. net.

CAIRD and Cathcart's handbook is so well known that it needs no testimonial. For its size there is probably no book on surgical methods which contains so much useful and practical information. Students, house surgeons, and practitioners will continue to regard this book as a guide to the treatment of surgical emergencies, and perhaps even more as a source of information regarding the application of bandages, splints, and all manner of apparatus required for injuries and deformities.

In the present edition a short note has been added on the use of antiseptics in time of war.

A Practice of Gynaecology. By HENRY JELLETT, M.D., F.R.C.P.
Fourth Edition. Pp. 618. With 385 Illustrations. London:
J. & A. Churchill. 1916. Price 21s. net.

As the author states in the preface, in this the fourth edition of a *Short Practice of Gynaecology*, he has produced a more ambitious work than in the previous editions.

This is to be regretted, as the character of the previous volumes has been lost, in so far as it was mainly a book for students and practitioners, by whom it was much appreciated, while the present volume forms by no means a complete work of reference, such as is required by the gynaecological specialist.

Perhaps the best chapter is on uterine displacements, which are thoroughly considered from the points of view of origin, prophylaxis, and treatment.

The recommendation of the examination of all women three or four weeks after their confinement is to be strongly supported.

It is too seldom practised, and there can be little doubt that backward displacements, which are so commonly found at this time, can be more efficiently and easily treated and cured than later, after they have given rise to much discomfort.

Uterine fibromyomata are by no means fully dealt with. The important group of cervical fibroids has been entirely ignored. The descriptions of operations in general are good, but the use of the finger for perforating the broad ligaments and stripping the anterior layer of peritoneum in supravaginal hysterectomy seems crude and offers no advantages. In the operative treatment of chronic inversion no men-

tion is made of abdominal hysterotomy, nor in ventrofixation and suspension is described the excellent method of pulling the round ligaments between the layers of the broad ligaments and stretching them to the abdominal fascia.

The chapter on radiotherapy is too much of a learned treatise on the subject in general, with too little of the gynaecological aspect in particular.

The illustrations are excellent and many are original.

Materia Medica, Pharmacy, Pharmacology, and Therapeutics. By W. HALE WHITE, M.D. (Lond.). Fifteenth Edition. Pp. xii. + 712. London: J. & A. Churchill. 1916. Price 7s. 6d. net.

THE merits of this popular and condensed book, by Dr. Hale White, are too well known to need eulogy. Condensation carried to such lengths, however, has the serious disadvantage of misleading, or at least of rendering a meaning unintelligible. The repeated use of such vague terms as "stomachic" and "carminative" conveys to the learner an impression of accurate pharmacological knowledge which is not justified. To describe as "caustic" the action of arsenious acid without explanation is insufficient. To group the Olea on p. 22 without differentiating the fixed from the essential oils seems useless, and to state on p. 5 that they are soluble in the same media is misleading. There is no indication that the usefulness of dialysed iron is disputed by pharmacologists, or that the advantages of ferric cacodylate (p. 207) are illusory. Finally, so condensed is the account of the Atropaceæ that on p. 390 atropine is stated to be a cerebral excitant, on p. 399 that its actions are identical with those of hyoseyamine, and on the same page that the latter is used as a cerebral depressant. The average medical student may have some difficulty in understanding this.

Introduction to Dermatology. By NORMAN WALKER. Sixth Edition. Pp. 363. With 63 Coloured Plates and 89 Illustrations. Edinburgh and London: W. Green & Sons. 1916. Price 15s. net.

THIS edition of a deservedly popular work is larger and contains much new material, besides being, to a certain extent, remodelled. The author has utilised the abilities and experience of Dr. Cranston Low to do "all the general spade work" as well as the new article on pellagra. Those who have studied the previous editions will recall the lovely coloured illustrations, and the value is now enhanced by the addition of other twenty of these, as well as other ten uncoloured. There is no

better illustrated work on dermatology, and this factor is a great one from the utility point of view.

The text is written in terse language and is rich with the experience of a shrewd observer.

If the ordinary practitioner had knowledge as extensive as this introduction, and followed its accurate teaching, he would make fewer mistakes, and be less prone to blindly give arsenic and lard or boracic ointment as he does at present.

We cordially recommend this work, which is really atlas and text-book combined.

Aids to Bacteriology. By C. G. MOOR and W. PARTRIDGE. Third Edition. Pp. viii. + 278. London: Baillière, Tindall & Cox. 1916. Price 3s. 6d. net, cloth; 3s. net, paper.

THE fact of a third edition of this pocket manual emphasises both its utility and its determination to keep thoroughly up to date. If consulted, as it is intended to be—an aid and not a substitute for a text-book—it is a valuable asset on the medical book-shelf. The new edition shows careful revision and is considerably enlarged. An important section of the book is allotted to the sanitary aspect of the subject, useful in the light of the fresh experiences of large armies in the field.

BOOKS RECEIVED.

BARNET, H. N.	The Student's Text-Book of Surgery	(Wm. Heinemann)	21s.
BRUNTON, Sir T. LAUDER.	Collected Papers on Circulation and Respiration	(Macmillan & Co., Ltd.)	5s.
COOPER, ARTHUR.	The Sexual Disabilities of Man. Third Edition	(H. K. Lewis & Co., Ltd.)	6s.
ELSBERG, CHAS. A.	Diagnosis and Treatment of Surgical Diseases of the Spinal Cord and its Membranes	(W. B. Saunders Co.)	—
GHOSH, R.	A Treatise on Materia Medica and Therapeutics. New Edition	(Hilton & Co., Calcutta)	7s. 6d.
HALLIBURTON, W. D.	The Essentials of Chemical Physiology. Ninth Edition	(Longmans, Green & Co.)	6s.
HUTCHISON, ROBERT, and HARRY RAINY.	Clinical Methods. Sixth Edition	(Cassell & Co., Ltd.)	10s. 6d.
MACEWEN, J. A. C.	Surgical Anatomy. Second Edition	(Baillière, Tindall & Cox)	10s. 6d.
MOULLIN, C. M.	The Biology of Tumours	(H. K. Lewis & Co., Ltd.)	2s. 6d.
PENHALLOW, D. P.	Military Surgery	(H. Frowde, Hodder & Stoughton)	15s.
PORTER, W. G., and P. M'BRIDE.	Diseases of the Throat, Nose, and Ear	(Wright & Sons, Ltd.)	7s. 6d.
RAMSEY, W. R.	Care and Feeding of Infants and Children	(J. B. Lippincott Co.)	9s.
SCHARLIEB, MARY.	The Hope of the Future	(Chapman & Hall, Ltd.)	6s.
SCHWEINITZ, G. E. DE.	Diseases of the Eye. Eighth Edition	(W. B. Saunders Co.)	—
SKILLERN, R. H.	The Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose. Second Edition	(J. B. Lippincott Co.)	21s.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

"The British Journal of
Ophthalmology."

WE have received and added with pleasure to our exchange list an ophthalmic journal which has made its appearance with the new year.

The British Journal of Ophthalmology comes into existence through the amalgamation of three well-known periodicals, viz.:—*Reports of the Royal London Ophthalmic Hospital*, *The Ophthalmic Review*, and *The Ophthalmoscope*.

Since 1857 the staff of the Royal London Ophthalmic Hospital, Moorfields, have published from time to time reports of their clinical and operative experiences, which now fill twenty volumes.

The Ophthalmic Review, which was founded in 1881, provided a channel for the more prompt publication of short original papers and critical notes and abstracts of current ophthalmic literature during the past thirty-five years. It was edited for several years by Mr. Priestley Smith of Birmingham, later by Dr. W. G. Sym of Edinburgh, and more recently by Mr. J. B. Lawford, F.R.C.S., London.

The Ophthalmoscope made its appearance in 1903, and with similar but more ambitious aims has been conducted with marked success under the editorial direction of another Edinburgh graduate—Mr. Sydney Stephenson, M.B., F.R.C.S.E. He now becomes the editor-in-chief of the new journal, and is supported by an editorial committee which includes practically all the oculists who were on the staffs of the above periodicals. Besides these, representatives have been secured in every important British colony. It is hoped by this concentration of energy that the new journal will take a leading place in the current literature of ophthalmology, and attract contributions from all parts of the British Empire.

We note with interest that the ophthalmic surgeons of the country have followed our own example, and by organising a limited liability company have constituted themselves proprietors of this new magazine. We cordially welcome its appearance. We congratulate especially Mr. W. H. H. Jessop, F.R.C.S., the president of the Ophthalmological Society of the United Kingdom, who has been the moving spirit in the amalgamation, and we heartily wish success to the undertaking.

A COMPARISON OF SOME ANTISEPTICS IN RESPECT
TO THEIR DIFFUSIBILITY, ACTION ON LEUCO-
CYTES, AND ACTION ON FERMENT ACTIVITY.

FROM THE ROBERT WALTON GOELET RESEARCH FUND, HÔPITAL
COMPLÉMENTAIRE, V.R. 76, RIS-ORANGIS, FRANCE

By HUGH E. MAGEE, B.Sc.

BACTERICIDAL power has long been accepted as the criterion of the value of a dressing solution. So long as a solution is toxic for bacteria little attention is paid to its effects on the tissues or as to how far this bactericidal action is applicable. Possessing the common property of bactericidal action, many antiseptic compounds contrast markedly in other respects. In order to demonstrate wherein antiseptic solutions differ from each other, a comparative study was made of some of the commoner bactericidal agents in regard to diffusibility, chemiotactic action, and action on ferment activity. These characteristics were chosen for the following reasons:—

1. High diffusive power is well recognised as a valuable property for a bactericidal agent. The penetrative power of protein precipitants is determined by their fixative action on the first protein with which they come in contact; hence their rates of diffusion are greatly impeded in an albuminous medium. Even those substances which do not precipitate albumins vary greatly in their penetration into albuminous solutions.

2. An agent which can bring into the field of infection a sufficient number of leucocytes to combat the invasion is of more value than one which repels them.

3. The action of antiseptics on ferment activity requires some foreword as to the value of such a study. A consideration of the following points may demonstrate its clinical bearing:—

(a) Many wounds are characterised by the large amount of tissue devitalised by the projectile. In the subsequent sloughing of the necrotic mass, autolysis very probably plays an important part. This process is generally believed to be due to autogenous ferments set free after death of tissue. These ferments set to work, resolving the tissue constituents into simpler bodies, which are more vulnerable to bacterial attack than native protein, and thus there is produced a medium favourable for bacterial propagation. It is also a well-known clinical fact, and has been shown

experimentally in this laboratory,* that the presence of dead tissue in a wound influences for the worse the course of an infection.

(b) The destructive action of many bacteria is believed to be due to bacterial ferments. By this means the tissues are resolved into less complex and probably toxic bodies. As the result of these two actions poisonous products gain entrance to the system and grave symptoms very often follow from their toxic action.

Clearly, then, it would be beneficial to prevent ferment activity of any kind in an infected wound.

As the above properties of diffusibility, chemiotactic action, and action on ferment activity are shared in different degrees by various germicidal solutions, this work is published in the hope that it may throw some light on the various clinical results obtained from their use in the treatment of wound infections.

Diffusion of Antiseptics.—To obtain a comparative idea of the diffusing powers of chemical substances various methods may be employed, many of which are complex and tedious. An antiseptic, when applied to wounds, has to operate in a medium proteid in nature. A diffusing medium of an albuminous character is on this account the most logical to employ. The following simple method, which gave consistent results, was made use of to carry out the above study:—

Two tubes, A and B, of equal bore and 22 cm. long, are marked 2 cm. from the top. The lower ends are connected by a piece of rubber tubing equal in bore to that of the tubes. At the lower end of B a clip, C, is fastened. A screw clip is the most suitable. It will be seen that when C is tightened in place, B is cut off from the bend of the rubber tubing and A. The tubes thus arranged are fastened to a stand with double clamps, in such a way as to bring the marks on each to the same level. Into A is poured a 10 per cent. egg-white solution in physiological saline until it just appears above the rubber tubing. All air-bubbles are then carefully squeezed out of the rubber bend and the solution poured in up to the mark. Into B is poured the antiseptic up to a height sufficient to balance the column of fluid in A. This is determined beforehand by trial. Consequent on the pouring in of the solution there is always some movement, which must be avoided. To do this the clip is kept closed for half or three-quarters of an hour (when all eddies will have ceased), and then opened carefully. The two columns of fluid come in contact, and if any precipitate forms; it falls down to the bottom of the U bend without affecting the

* Taylor, "Tissue Fragments and Wound Infections," *Annals of Surgery*, 1916.

column of fluid in A. The antiseptic then has to diffuse through the albuminous medium from the lower end of B up to the top of A. After 24 hours from 1 to 2 c.c. are drawn from the top of A with a pipette and tested for the chemical in question. If present the experiment is repeated, and A is tested at the end of 18, 12, or 6 hours until the exact time is found. Once any fluid is withdrawn from A, currents are liable to be set up, and so the experiment must be repeated. If the test is negative one examines A after longer intervals of time.

Solution.	Strength.	Time taken to reach Top of Column of Fluid.	Test Employed.	Action on Contact with Proteins.
Phenol.	2.5%	18 hours.	Taste and violet coloration with Fe_2Cl_6 .	Coagulation of protein.
Quinine hydrochloride.	2.5%	15 hours.	Taste and white precipitate with NH_4OH .	Slight precipitation of quinine occurs owing to alkalinity of albumin.
Chinosol.	2.5%	7 hours.	Taste and white precipitate with BaCl_2 .	Slight precipitation of chinosol owing to alkalinity of albumin.
Ammonium fluoride.	2.5%	11.5 hours.	CaCl_2 . White gelatinous precipitate soluble in HCl.	No action.
Sodium fluoride.	2.5%	12 hours.	CaCl_2 . White gelatinous precipitate soluble in HCl.	No action.
Quinine hydrofluoride.	2.5%	9 hours.	Same as quinine HCl.	Same as quinine HCl.
Tincture of iodine.	2.5%	None found after 7 days.	Blue colour with starch.	Coagulation of protein.
*Mercuric chloride.	Sat. sol.	48 hours.	Yellow precipitate, with KOH blackening on boiling.	Coagulation of protein.
Acetic acid.	2.5%	12 hours.	† Bleaching of solution of dilute alkali coloured by phenolphthalein.	In this concentration does not entirely precipitate all the protein.
Sodium bicarbonate.	2.5%	32 hours.	† Pink colour on adding phenolphthalein and heating.	No action.

* This solution was made saturated in order to render it more easily detected.

† As a control for these tests an equal amount of 10 per cent. egg albumen was treated similarly with the indicator.

The tests employed were in each case the most delicate and most characteristic. Each of the figures given is the mean of several experiments. The average was only taken of those figures falling within a reasonable distance of each other.

Chinosol was by far the most diffusible substance dealt with, and tincture of iodine the least. When experimenting with the latter substance, a solid plug of coagulated albumin was formed at the junction of the two columns of fluid, through which the iodine seemed unable to penetrate. At the end of seven days no trace of iodine was found at the top of A.

Chemiotactic Action of Antiseptics.—The object of the following experiments was to demonstrate the action *in vitro* of different compounds on the leucocytes. Wright's technique was adopted for this work.

As stated in his book on *Wound Infections*, this technique can be carried out in three different ways—(a) Superposition of solution on clotted blood; (b) superposition of solution on unclotted blood; (c) method of traversing. Method (c) was found to be applicable to only a very few substances. Most of the solutions could not be tested by this method, because they either caused hæmolysis of the red cells and obscured the result, or prevented coagulation and the formation of the white clot. In these experiments methods (a) and (b) were employed. Both have their disadvantages: (b) suffers from the defect that, if the solution is hæmolytic, when centrifuging there is always a little blood hæmolyzed at the line of contact with the solution, and if the solution has a higher specific gravity than that of the blood, it is thrown down into the clot; (a) has the disadvantage that the chemicals have to penetrate down through the white clot, *i.e.* after the blood has already clotted, and the factor of the time and rate of diffusion of each substance must be considered. In working with this method, the tubes with the solution superimposed, along with the controls which had no fluid on top, were put in the ice-chest; in order to allow the chemical to diffuse down to the leucocytes. In case of substances which had been found to be very diffusible, about three hours in the ice-chest was given, while with those less diffusible a longer time was allowed. The tubes were then incubated twelve hours at 37° C., the clots blown out stained with methylene blue, dehydrated in alcohol and mounted in balsam. Where possible, method (b) was always employed, for in using it one could be more certain that the chemical had been able to reach the leucocytes. When mounted the clots were examined under

a low power. The length of the emigration was measured by means of a micrometer scale. The apex of the cone was taken as the base line and the distance measured up to the limit of the emigration. The results are expressed in units of the scale. Each of the figures given is the mean of several experiments. It was frequently noticed, especially with substances which coagulate protein, that while some of the tubes differed much from the normal, others were found apparently not to have been affected. This was attributed to the probability that the antiseptic had not diffused down to the leucocytes. Such tubes were always omitted when making the average.

The solutions used were for the most part very dilute. Strong solutions were debarred, owing to crystallisation of some of the compounds after incubation. Moderately strong solutions could only be employed in those instances where the chemical had no coagulative or hardening action on the white clot. In many cases when other than weak solutions were employed, the subsequent manipulation of the technique was impossible.

Antiseptic.	Concentration.	Method.	Experimental Tubes. Length of Emigration.	Control Tubes. Length of Emigration.	Length of Emigration in Experimental Tubes Minus Length in Control Tubes.
Quinine hydrochloride . . .	0.25%	b	0.94	1.4	-0.46
Thymol . . .	Sat. solution	b	2.23	1.2	+1.03
Thymol . . .	$\frac{1}{2}$ Sat. solution	b	3.3	1.5	+1.8
Potassium iodide . . .	0.25%	b	2.8	1.3	+1.5
Potassium iodide . . .	0.125%	b	2.7	1.5	+1.2
Saline . . .	0.87%	b	1.02	0.9	+0.12
Chinosol . . .	0.5%	b	1.03	1.0	+0.03
Salicylic acid . . .	Sat. solution	a	1.74	1.3	+0.45
Phenol . . .	0.5%	a	0.7	1.3	-0.6
Phenol . . .	1.0%	a	0.5	1.3	-0.8
Dakin's solution . . .	(0.5 to 0.7% NaOCl)	a	0.7	1.5	-0.8
Sodium fluoride . . .	0.5%	a	0.4	1.3	-0.9
Camphor . . .	Sat. solution	a	1.8	1.5	+0.3
Soda bicarbonate . . .	0.5%	a	1.8	1.4	+0.4
Soda bicarbonate . . .	2.0%	a	1.6	1.6	+0.0
Soda bicarbonate . . .	0.75%	b	2.0	1.55	+0.5
Acetic acid . . .	0.5%	a	0.37	0.8	-0.5
Acetic acid . . .	1.0%	a	0.31	1.5	-1.19

Summary.—In regard to their action on the leucocytes, these chemical substances can be divided into three groups—(1) Those that attract the leucocytes; (2) those that repel them; (3) those having no distinct action either way.

1. Thymol and potassium iodide occupy first place as positive chemiotactic substances. Salicylic acid and low concentrations of sodium bicarbonate have a much less marked effect.

2. Dakin's solution, phenol, sodium fluoride, and fairly strong solutions of acetic acid are decidedly negative chemiotactic substances, while quinine and weak acetic acid have a much less pronounced action.

3. Chinosol, physiological saline, camphor, strong solutions of sodium bicarbonate, have only a slight influence on the white corpuscles.

Action of Antiseptics on Ferment Activity.—It was at first decided to study autolysis, as takes place in dead muscle, for these experiments; but such work is tedious and uncertain, and it is well-nigh impossible to exclude the factor of bacterial decomposition. For this reason trypsin was chosen as the most convenient ferment for laboratory experiments. Considering its close analogy with the autolytic ferments, it is not too much to hope that results obtained from a study of the one may be applicable to the other.

Experiments.—Into a number of tubes were put 20 c.c. of a solution of the antiseptic in varying concentrations, and 3 c.c. of a solution of trypsin in distilled water, to which a pinch of salt had been added. Different samples of trypsin being employed, a control was used for each experiment. About the same measured amount of trypsin was taken to make up the solution for each set of tubes. Blocks of coagulated egg-white, as nearly as possible the same size and shape, were cut and one added to each tube. After incubating for 18 hours, the extent of digestion was estimated by Sørensen's method. The same amount of the same neutral formol was added for each titration. Many of the agents experimented with had acid properties, or interacted with NaOH. To obviate this difficulty, the NaOH was added in each titration until a faint pink colour was produced before adding the neutral formol. The control was treated similarly. In this way a neutral solution was obtained before estimating the amino acids. In case of substances whose colour might interfere with the phenolphthalein, the fluid was largely diluted and rather more indicator added than ordinarily. The stock of neutral formol was kept corked in the course of each estimation to prevent oxidation.

Mode of Action of the Antiseptic.—It can be seen from the results, that most of the above substances inhibit ferment action to a greater or less extent. Some substances, such as

potassium iodide, have little or no effect on tryptic action. Leaving aside such compounds as have only a very slight action, the *role* of the more marked antiferments may be considered. There are two factors which can be influenced by the antiseptic—(A) The ferment, (B) the substrate. The suppression of digestion may be due to the action of the antiseptic on one or both of these.

Solution.	Concentration.*	Amount of Digestion in Terms of c.c. N/10 NaOH per 10 c.c. of Mixture.	Control-Digestion in Terms of c.c. N/10 NaOH per 10 c.c. of Mixture.
Quinine hydrochloride	0.14%	0.25 c.c.	0.75 c.c.
Quinine hydrochloride	0.27%	No digestion	0.75 c.c.
Phenol	0.14%	0.30 c.c.	0.75 c.c.
Phenol	0.27%	0.20 c.c.	0.75 c.c.
Phenol	1.10%	0.15 c.c.	0.75 c.c.
Phenol	2.16%	No digestion	0.75 c.c.
Chinosol	0.14%	0.30 c.c.	0.75 c.c.
Chinosol	0.54%	0.20 c.c.	0.75 c.c.
Chinosol	1.10%	No digestion	0.75 c.c.
CuSO ₄	0.14%	No digestion	0.90 c.c.
AgNO ₃	0.14%	No digestion	0.65 c.c.
NaCl	0.50%	0.75 c.c.	0.90 c.c.
NaCl	0.87%	0.90 c.c.	0.90 c.c.
NaCl	5.00%	0.34 c.c.	0.90 c.c.
NaCl	10.0%	0.30 c.c.	0.90 c.c.
NaCl	33.5%	No digestion	0.90 c.c.
Mercuric chloride	0.14%	0.05 c.c.	0.50 c.c.
Mercuric chloride	0.27%	No digestion	0.50 c.c.
Salicylic acid	0.17%	0.25 c.c.	0.65 c.c.
Salicylic acid	0.02%	0.50 c.c.	0.65 c.c.
Thymol	$\frac{1}{4}$ Sat. sol.	0.60 c.c.	0.85 c.c.
Thymol	Sa t. sol.	0.30 c.c.	0.85 c.c.
Picric acid	0.06%	0.75 c.c.	0.95 c.c.
Picric acid	0.24%	0.40 c.c.	0.95 c.c.
Picric acid	0.96%	0.20 c.c.	0.95 c.c.
Acetic acid	0.14%	0.40 c.c.	0.95 c.c.
Acetic acid	0.54%	0.30 c.c.	0.95 c.c.
Acetic acid	2.16%	0.25 c.c.	0.95 c.c.
Potassium iodide.	0.14%	0.80 c.c.	1.0 c.c.
Potassium iodide.	2.16%	0.85 c.c.	1.0 c.c.

* *I.e.* the actual concentration of the compound in the 23 c.c. of digestion mixture.

(A) *Action on the Ferment.*—This can be brought about as follows:—(a) Removal of ferment by precipitation; (b) specific antiferment action.

(a) If the ferment is entirely precipitated it is no longer capable of digesting. The only compounds capable of producing this effect are those that coagulate proteins. If ferments are true proteins they must be entirely thrown down by such reagents in excess.

To determine whether treatment with protein precipitants removes all the ferment from solution the following experiments were carried out:—To some trypsin solution was added AgNO_3 in excess; the mixture was filtered. The excess of AgNO_3 was then removed by adding NaCl in slight excess. The AgCl was filtered off and the filtrate passed through a bougie. On testing the resulting liquid, both biuret and xanthoproteic reactions were faintly positive. This proved that treatment with protein precipitants fails to remove all the protein matter.

The next step was to find out whether the residual substance, probably ferment, was active or not. Two equal quantities of trypsin were taken. One was treated with AgNO_3 as above, and after the AgCl had been removed the filtrate was made up to 20 c.c. The other portion of trypsin, which was to act as a control, was dissolved in diluted saline and filtered twice through paper. The filtrate was made up to 20 c.c. To each filtrate a piece of coagulated egg-white was added. Both were incubated 18 hours and examined. In the control tube digestion had taken place, but the treated tube had undergone no change. To what, then, was this difference due? The treated filtrate differed from the control filtrate in the following particulars:—

1. In containing NaNO_3 in solution ($\text{AgNO}_3 + \text{NaCl} = \text{AgCl} + \text{NaNO}_3$). On testing NaNO_3 it was found to have no marked antiferment action. Suppression of tryptic digestion was not obtained in 5 per cent. concentration of this salt.

2. The NaCl content may have been sufficient to inhibit the action of trypsin. This is unlikely, since NaCl was only added as long as a precipitate formed.

3. In having been in contact with AgNO_3 for some time. It is most probable that during this time the ferment had been rendered inert by the AgNO_3 .

(b) *Specific Antiferment Action*.—Chinosol ($\text{C}_9\text{H}_6\text{NKS}_4$) and quinine are not protein precipitants, yet they suppress tryptic activity in comparatively low strengths. Their action is then apparently specific, and for this reason they must be placed in a separate category from compounds of the protein precipitant type.

(B) *Action on Substrate*.—It is possible that the substrate, while in contact with the antiseptic, may have been hardened by the latter or may have formed some compound with it, so that even the addition of fresh ferment would be incapable of acting on it. This led up to the following experiments:—

Two pieces of coagulated egg-white were taken. One was

incubated 6 hours in 2.5 per cent. CuSO_4 and another in 2.5 per cent. quinine. The two treated pieces of egg-white were incubated 24 hours in several changes of distilled water, and afterwards boiled in fresh distilled water for about an hour. Practically all the quinine was removed from the albumin, but with the exception of a little in the first changes of water, no CuSO_4 was removed. The presence of Cu in the egg was evidenced by its blue colour. Even dilute NH_4OH failed to withdraw any Cu, as was found by a separate experiment. The two pieces of egg were put into separate tubes and 15 c.c. of aqua dist. added. A control tube containing untreated egg was also prepared in the same way. To each tube was added an equal amount of trypsin solution. After 18 hours' incubation, the tubes were examined and the following figures obtained:—

Substrate.	Amount of digestion in terms of c.c. N/10 NaOH.
Control	1.6 c.c. N/10 NaOH = 10 c.c. mixture.
Quinine treated	1.3 " " " "
CuSO_4 treated	0.9 " " " "

The inhibition of digestion in the quinine-treated substrate was very probably due to small traces of quinine still left behind. Had the washing been continued long enough all the quinine would in all probability have been removed. The tube containing the CuSO_4 -treated substrate showed some of that salt in solution. Apparently the ferment had been able slowly to act on the egg, and in doing so, had set free the Cu which had been in combination with the albumin. Another piece of egg similarly treated with CuSO_4 , and subsequently washed, failed to give up any of its Cu to a solution of uncoagulated albumin when incubated for 24 hours at 37°C . with a few drops of CHCl_3 , to prevent the action of bacteria. The fixation of the Cu was not due, therefore, to any mere adsorption on the part of the coagulated protein.

The conclusion to be drawn from this is, assuming CuSO_4 to be typical of the protein precipitants, that these chemicals unite with the coagulated albumin to form a more or less stable compound. Boiling water does not break up this combination, but fresh trypsin does. On the other hand, those substances which have no coagulative action on proteins, form no such combination, since they can be washed out with boiling water.

Summary.—Antiferment chemical substances fall into two

main groups—(1) Protein precipitants; (2) true antiferments. The members of the former group inhibit ferment activity in three ways—(a) By removal of the ferment by precipitation. This precipitation is probably brought about not so much by precipitation of the ferment as such, but by its being carried down with the proteins with which all preparations of ferments are associated. (b) By a direct antiferment action. This probably plays only a subordinate part, since the amount of ferment left in the filtrate in the above experiments was scarcely detectable. (c) By combining with the substrate. The resulting compound can still be acted on by fresh ferment, though the action is markedly inhibited. As the result of the ferment action, amino acids and the antiseptics are set free. In exactly what proportions these different modes of action are manifested, it is impossible to say. It seems likely, however, that the main part of the action follows the lines of (a) and (c).

Quinine and chinisol not being protein precipitants, must be placed in the second group. They stop tryptic action in low concentrations. It is safe, then, to assume that their action is specific in nature.

I desire to express my sincere thanks to Dr. Kenneth Taylor for his valuable suggestions and assistance in the prosecution of the research.

CLINICAL STUDIES.
XIII.—ETIOLOGY OF DISSEMINATED SCLEROSIS.

By BYROM BRAMWELL, M.D., F.R.C.P.E., LL.D., F.R.S.E., Consulting Physician, Royal Infirmary, Edinburgh ; Physician, Chalmers Hospital, Edinburgh.

Sex.—The statistics of different observers differ on this point. Some say that the disease is more common in males, others in females. In my 200 cases 111, or 55·5 per cent., were females and 89, or 44·5 per cent., were males.

Age at Onset.—All observers are agreed that disseminated sclerosis usually commences in early adult life, between the ages of sixteen and thirty-five ; that it very rarely commences during infancy and childhood, and that it is very rarely developed after the age of fifty. These statements are fully borne out in my cases. In my 200 cases no less than 67, or 33·5 per cent., commenced between the ages of twenty-one and twenty-five years (inclusive) ; 130, or 65 per cent., between the ages of sixteen and thirty years (inclusive) ; and 157, or 78·5 per cent., between the ages of sixteen and thirty-five years (inclusive). In one of my cases the disease commenced at the age of two, in one at the age of seven, in one at the age of ten, in two cases at the age of eleven, in two at the age of thirteen, and in one case at the ages of fourteen and fifteen years respectively. In only 5 of the 200 cases did the disease develop (or appear to develop) after the age of fifty, viz. at the ages of fifty-two, fifty-four, fifty-six, and fifty-eight years respectively.

The age of commencement (at which the symptoms were first noticed) is shown in the following Tables I. and II. :—

TABLE I.—SHOWING THE AGE AT ONSET IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

Age.	No. of Cases.	Age.	No. of Cases.	Age.	No. of Cases.
2 . . .	1	Brot. forward	81	Brot. forward	168
7 . . .	1	24 . . .	10	37 . . .	5
10 . . .	1	25 . . .	12	38 . . .	1
11 . . .	2	26 . . .	6	39 . . .	3
13 . . .	2	27 . . .	5	40 . . .	3
14 . . .	1	28 . . .	11	41 . . .	5
15 . . .	1	29 . . .	7	42 . . .	3
16 . . .	6	30 . . .	7	43 . . .	3
17 . . .	3	31 . . .	4	44 . . .	1
18 . . .	8	32 . . .	7	47 . . .	3
19 . . .	3	33 . . .	6	52 . . .	1
20 . . .	7	34 . . .	6	54 . . .	2
21 . . .	16	35 . . .	4	56 . . .	1
22 . . .	12	36 . . .	2	58 . . .	1
23 . . .	17				
Carry forward	81	Carry forward	168	Total .	<u>200</u>

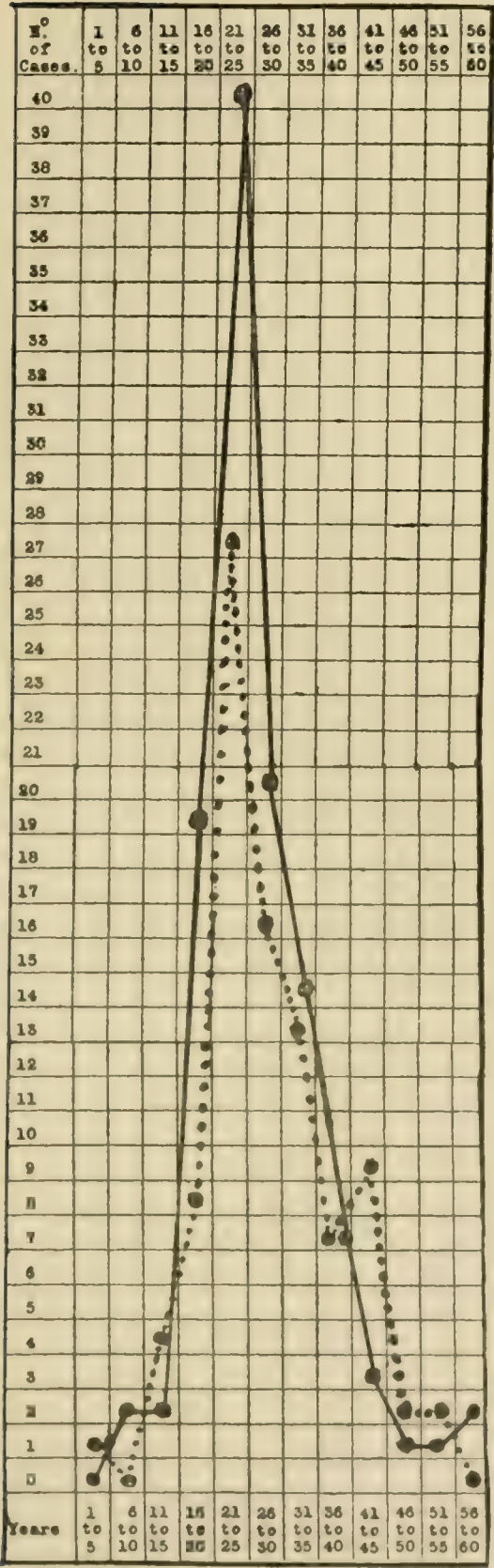


FIG. 1. Graphical Representation of the Age-Period of Development in 200 Cases of Disseminated Sclerosis (111 Females and 89 Males).

The horizontal figures represent the age-periods of five years, the vertical figures represent the number of cases occurring in each of these periods of five years.

The heavy (black) curve represents the female, and the dotted curve the male cases.

The similarity of the two curves is very remarkable and seems to suggest that the age-period at which the disease is most frequently developed is a very definite one.

TABLE II.—SHOWING THE AGE AT WHICH THE SYMPTOMS WERE FIRST NOTICED IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS, GROUPED IN PERIODS OF FIVE YEARS.

Age.	Males.	Females.	Total.	Per Cent.
1 to 5 years, incl.	1	0	1	4·5
6 to 10 " "	0	2	2	
11 to 15 " "	4	2	6	
16 to 20 " "	8	19	27	78·5
21 to 25 " "	27	40	67	
26 to 30 " "	16	20	36	
31 to 35 " "	13	14	27	
36 to 40 " "	7	7	12	17
41 to 45 " "	9	3	14	
46 to 50 " "	2	1	3	
51 to 55 " "	2	1	3	
56 to 60 " "	0	2	2	
	89	111	200	100

From this table (which is diagrammatically represented in Fig. 1) it will be seen—

1. That in those cases in which the disease commenced before the age of sixteen the number of males and females (5 males and 4 females) was, practically speaking, the same.

2. That in those cases in which the disease commenced between the ages of sixteen and thirty (inclusive) there were many more females than males (79 females and 51 males).

3. That in those cases in which the disease commenced after the age of thirty there were more males than females (33 males and 28 females). These facts are shown in Table III.

TABLE III.—SHOWING THE RELATIVE NUMBER OF MALES AND FEMALES IN THOSE CASES IN WHICH THE DISEASE COMMENCED BEFORE SIXTEEN, BETWEEN SIXTEEN AND THIRTY INCLUSIVE, AND AFTER THE AGE OF THIRTY YEARS, IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

Age at Commencement.	Males.	Females.	Total.
Before 16	5	4	9
Between 16 and 30 (inclusive) .	51	79	130
After 30	33	28	61
	89	111	200

Married or Widowed, Single.—One hundred and sixteen of the patients were single, 72 of the patients were married, 4 patients were widowed, and in 8 cases the condition as regards marriage is not mentioned in the notes.

Of the 76 patients who were married or widowed the disease commenced before marriage in 13 cases. Consequently, in 129 of the 192 cases in which the condition as regards marriage is mentioned in the notes, the patients were unmarried when the disease commenced (when the symptoms were first noticed). These results are shown in the following table:—

TABLE IV.—SHOWING THE CONDITION OF THE PATIENTS AS REGARDS MARRIAGE WHEN THE DISEASE COMMENCED.

	No. of Cases.
Single	129
Married or widowed	63
Not stated	8
	<hr/> 200

Hereditry.—In none of my 200 cases did the disease appear to be directly inherited, but a daughter of one of my female patients and the son of another female patient are said to be suffering from the disease. In comparatively few cases did the patients come of a nervous stock; in the majority of cases the patients were, prior to the development of the symptoms, non-nervous, healthy young men and women.

Two of my patients are sisters; in one case the brother of one female patient also suffers from the disease.

Occupation.—The occupations of the patients were very various, and, so far as I have been able to detect, did not have any special influence on the production of the disease. The most noticeable point is that no less than 72 of the 200 cases were employed in housework at home, or living at home in good circumstances (*i.e.* without any employment). The great majority of the patients were either comfortably or fairly well circumstanced as regards their home surroundings; only a small proportion were in very poor circumstances.

The occupation of the patients is shown in the following table:—

TABLE V.—SHOWING THE OCCUPATION IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

Baker 2	Brought forward 43	Brought forward 156
Blacksmith 3	Ex-soldier 1	Merchant 1
Block-cutter 1	Factory worker 1	Miner 6
Book-keeper 1	Farmer 5	Moulder 1
Brass-finisher 2	Farm worker 3	Music teacher 3
Cabinetmaker 1	Fitter 1	Nurse, hospital 1
Canvasser 1	Gardener 1	No occupation 1
Carter 1	Grocer 5	Photographer's as-
Chemical worker 1	Groom 2	sistant 1
Clergyman 2	Hat manufacturer 1	Plumber 3
Clerk 7	Hawker 1	Postman 1
Clothier 1	Home, lives at	Pupil teacher 2
Coach-painter 1	(either no oc-	Reporter 1
Comedian 1	cupation or	Roadmaker 1
Commercial traveller 1	employed in	Schoolgirl 1
Compositor 1	household	Shepherd 2
Cook 2	work) 42	Shipping agent 1
Crofter 2	Housewife 30	Shipowner 1
Dentist 1	House-painter 1	Shopkeeper 4
Domestic servant 3	Iron miner 1	Stevadore 1
Draper 2	Iron-tube worker 1	Stockbroker 1
Dressmaker 3	Kitchen porter 1	Stone-cutter 1
Electrical engineer 1	Labourer 9	Teacher 1
Employed in dye	Lady's companion 3	Veterinary surgeon 1
works 1	Laundress 1	Weaver in factory 1
Employed in rope	Machinist 1	Wool-sorter 1
works 1	Map engraver 2	Not stated 6
Carry forward 43	Carry forward 156	Total 200

Influence of Syphilis and Gonorrhœa.—Syphilis and gonorrhœa do not seem to have any influence in exciting or causing the disease.

In only three cases was there a definite history of a chancre; in two of these three cases there were no secondary or constitutional symptoms. In the case in which there was both primary and secondary syphilis the syphilis was thought to be the cause of the disseminated sclerosis; in it the first symptoms suggestive of disseminated sclerosis were noticed a few months after the chancre. In two other cases syphilis was probable. In two cases the patients were the subjects of inherited syphilis. In two cases the patients contracted syphilis some years after the symptoms of disseminated sclerosis were first noticed; in neither of these cases did the symptoms of the disease (disseminated sclerosis) seem to be aggravated by the syphilis. These results are set forth in the following table:—

TABLE VI.—THE FREQUENCY OF SYPHILIS IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

	No. of Cases.	
No suspicion of	125	} 184
Denied	59	
Chancre and secondary symptoms	1	} 5
Chancre without secondary symptoms	2	
Syphilis contracted after the disseminated sclerosis	2	
Congenital	2	2
Not stated	9	9
Total	<u>200</u>	<u>200</u>

My experience as regards the influence of syphilis in the production of disseminated sclerosis is the same as that of almost all observers. Almost all authorities are agreed that syphilis is very rarely, if ever, the cause of the disease.

Gonorrhœa.—My experience as regards the influence of gonorrhœa is the same as that of syphilis. In my cases it (gonorrhœa) did not seem to have any influence either in causing or exciting the disease. In only 8 of my 200 cases was there a definite history of gonorrhœa; in 4 other cases there was a doubtful history of gonorrhœa. These results are set forth in the following table:—

TABLE VII.—THE FREQUENCY OF GONORRHOEA IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

	No. of Cases.	
No suspicion of	124	} 170
Denied	46	
Admitted	8	} 12
Doubtful	4	
Not stated	18	18
	<u>200</u>	<u>200</u>

Apparent Supposed or Alleged Cause.—In 80 of the 200 cases there was no apparent or alleged cause for the disease. In the remaining 120 cases a great variety of different conditions appeared to be, or were alleged to be, the cause. On summarising these I find—

(a) *No Apparent Cause.*—In 80 cases there was no apparent cause for the disease.

(b) *Febrile or Infectious Diseases.*—In 28 cases a febrile or

infectious disease, either alone or in combination with some other cause, appeared to be, or was said to be, the cause of the disease.

In some of these cases—and the same statement applies to headings (c), (d), and (e)—careful inquiry showed that the febrile or infectious disease, which was supposed to be the cause, had been preceded by symptoms suggestive of disseminated sclerosis.

(c) *Mental Worry, Grief, etc.*—In 26 cases mental worry, grief, mental shock, a fright, either alone or in combination with some other cause, appeared to be, or was said to be, the cause of the disease.

(d) *A Chill, Wetting.*—In 18 cases a chill or getting wet through, either alone or in combination with some other cause, appeared to be, or was said to be, the cause of the disease.

(e) *Traumatic Injury.*—In 17 cases traumatic injury, either alone or in combination with some other cause, appeared to be, or was said to be, the cause of the disease.

(f) In 12 cases fatigue or physical strain, either alone or in combination with some other cause, appeared to be, or was said to be, the cause of the disease.

(g) Alcoholic excess and parturition appeared to be, or were respectively thought to be, the cause in 3 cases each.

(h) Sexual excess alone, or with some other cause, and tobacco excess, appeared to be, or were respectively thought to be, the cause in 2 cases each.

(i) A bilious attack, (?) leucorrhœa, bloodlessness, a surgical operation, suddenly arrested menstruation, (?) sunstroke, syphilis, walking on a painful corn, and working in a confined space with electric light, appeared to be, or were said to be, the cause in 1 case each. (See Table VIII.)

TABLE VIII.—SUMMARY OF THE DIFFERENT CONDITIONS WHICH APPEARED TO BE, OR WERE SUPPOSED TO BE, THE CAUSE IN TWO HUNDRED CASES OF DISSEMINATED SCLEROSIS.

No apparent or alleged cause	in 80 cases
Febrile and infectious diseases, either alone or with other cause	in 28 „
Mental worry, grief, mental shock, fright, either alone or with other cause	in 26 „
Chill, getting wet, either alone or with other cause	in 18 „
Injury, either alone or with other cause	in 17 „
Fatigue or physical strain, either alone or with other cause	in 12 „
Alcoholic excess	in 3 „
Carry forward	184

	Brought forward	184
Parturition	in	3 cases
Sexual excess, alone or with other cause	in	2 „
Tobacco excess	in	2 „
Bilious attack (probably a symptom, not a cause)	in	1 case
Suddenly arrested menstruation	in	1 „
Surgical operation	in	1 „
Syphilis	in	1 „
Walking on a painful corn	in	1 „
Working in a confined space with electric light	in	1 „
Bloodlessness, with other cause	in	1 „
? Leucorrhœa	in	1 „
? Sunstroke	in	1 „
		<hr/> 200

From this analysis it will be seen that in the 120 cases in which some condition or another (such as a febrile or infectious disease, mental worry, trauma, fatigue, etc.) appeared to be, or was supposed to be, the cause of the disease, the nature of that supposed cause was most diverse. It is certain that in many of these 120 cases the supposed cause was not in reality the starting-point of the disease but was merely an aggravating condition. In several cases in which a definite cause (such as influenza, a chill, mental worry, traumatic injury, etc.) was said to be the starting-point of the disease, careful investigation shewed that some symptoms, such as diplopia, giddiness, temporary numbness, etc., had been present before the alleged cause came into operation.

It is no exaggeration, I think, to say that in at least half of the 200 cases there was no obvious cause for the disease. Further, in those cases in which a definite cause appeared to be, or was said to be, present, the diversity of the conditions which were thought to be the cause, in individual cases, makes it difficult to suppose that the alleged cause was in reality the starting-point and sole cause of the disease.

The fact that in the great majority of cases of disseminated sclerosis the first manifestations of the disease are observed between the ages of sixteen and thirty; that the disease so frequently attacks healthy, non-nervous young men and women; that the great majority of the patients are in good or fairly good circumstances; that a very large proportion of the (my) patients were engaged in household work or living in comfortable homes without any employment; that, according to most authorities, the sclerotic lesions are usually more abundant in the white matter of the brain and spinal cord; and the great diversity of the apparent or

supposed cause in different cases must, I think, be taken into account in seeking for an explanation of the etiology of the disease.

My observations seem definitely to show that syphilis and gonorrhœa are very rarely, if ever, the cause of disseminated sclerosis.

In only 1 of my 200 cases was there a history of metallic (lead) poisoning, and in that case the symptoms of disseminated sclerosis did not develop until three years after the plumbism. My cases, therefore, afford no evidence in favour of Oppenheim's opinion that metallic poisoning is a frequent cause of the disease.

Two theories, in particular, which have been advanced to account for the causation of disseminated sclerosis, deserve attention, viz.:—

1. *That the sclerotic lesions are the result of some irritant which is distributed through the nerve centres by the blood-vessels.*

In the third edition of my book on the *Diseases of the Spinal Cord*, published in the year 1895, I state with regard to this theory (p. 508): "The extensive way in which the lesions are diffused throughout the nerve centres is highly suggestive of a toxic cause; while the microscopic characters of the lesion, which seem to shew that the condition is a chronic inflammation of the neuroglial tissue, suggest the presence of an irritant. The fact that in a not inconsiderable proportion of cases the disease seems to have followed an acute infectious disease lends support to this view. Marie, in particular, is a strong advocate of this mode of origin; he states that the sclerotic lesions begin in the vascular walls and develop around the blood-vessels.

"The nature of the irritant which is probably the cause of the condition is unknown.

"In the present position, then, of our knowledge, it is impossible to say more than this, that the sclerotic lesions are probably the result of an irritant which is distributed through the nerve centres by the blood and blood-vessels; and that the irritant (micro-organism, toxin, ptomaine, or whatever it may happen to be) seems to have a special affinity for the neuroglial tissue of the white matter of the nerve centres and (perhaps) a special destructive action upon the white substance of the nerve tubes. It is difficult, I think, on any other supposition to account for the fact that the grey matter of the cerebral cortex, which is so richly supplied with minute blood-vessels, and in which secondary deposits carried by the blood-vessels (secondary deposits of melanotic sarcoma, for

example) are often abundantly developed, is so rarely affected (*i.e.* seat of the sclerotic lesions)."

In an article on disseminated sclerosis, published in my *Clinical Studies* in the year 1904, I also refer to this theory as follows (vol. ii. p. 208): "The extensive way in which the sclerotic lesions are diffused through the nerve centres is, at first sight, highly suggestive of a toxic cause. The microscopic characters of the lesion, which seem to show that the condition is due to a chronic inflammation of the neuroglial tissue, is also suggestive of the presence of an irritant. Marie and other supporters of this—the toxic—theory point out that in a considerable proportion of their cases the disease seems to have developed after an acute febrile or infectious disease (such as scarlet fever, influenza, etc.). But other observers have not noticed this connection in any considerable proportion of cases; and it cannot be doubted, as I have stated above, that in some of the cases in which a febrile or infectious disease seems to be the cause of the disseminated sclerosis that it was merely an exciting or aggravating condition, and that the disseminated sclerosis was already present in a slight or latent form prior to the onset of the febrile or infectious disease.

"The remarkable variations which occur from time to time in many cases of disseminated sclerosis—the marked improvements and sudden relapses—are suggestive of recurring intoxications and irritation of the nervous tissues. It is, however, difficult to suppose that fresh doses of a toxin are again and again introduced *ab extra*; it seems probable, if these recurring exacerbations are due to fresh intoxications, that the irritant, whatever it may be, is produced within the body. Of late years, auto-intoxication from the gastro-intestinal tract has become a well-recognised source of infection, and has been suggested as the cause of some nervous diseases (*e.g.* general paralysis of the insane); observations are, I think, required as to the condition of the gastro-intestinal tract in cases of disseminated sclerosis.

"It is difficult, I think, to explain the fact (if it is a fact, but on this point there is a difference of opinion) that the sclerotic lesions usually have their starting-point in the white matter of the brain and spinal cord on the toxic theory, unless one supposes that the white matter is more vulnerable to the action of the supposed irritant than the grey matter. If the sclerotic lesions are due to an irritant distributed by the blood and the blood-vessels, the grey matter, unless it is less vulnerable to the irritant, should, one would expect, be more frequently affected than the white matter since it (the grey matter) is more richly supplied with blood.

“Further, the facts that (a) in a large proportion of cases of disseminated sclerosis the disease develops without any apparent cause and that (b) in those cases in which there is some apparent cause, the nature of that cause is, in different cases, so very diverse seem opposed to the (purely) toxic theory.

“2. *That the disease is due to some developmental or congenital defect of the neuroglial or nervous tissue* (perhaps similar to, or analogous to, the gliomatosis in cases of syringomyelia) which renders it more vulnerable or liable to be affected by irritation than the neuroglial or nervous tissue of the normal individual.*

“Strümpell has strongly advocated this view. The facts that disseminated sclerosis is occasionally met with in young children; that in some cases in which the disease develops in adult life some symptoms have been present from childhood;† that the age-period at which disseminated sclerosis and syringomyelia are most frequently developed is very similar; that both conditions often seem to have their starting-point in some acute febrile disease, traumatic injury, etc.; and the difficulty of satisfactorily accounting for the production of the disease (disseminated sclerosis) on any other theory seem in favour of this view.

“Further, such a view does not include the possibility of other etiological factors (such as infections, intoxications, traumatism, and so on) acting as occasional or additional causes. On the contrary, it affords a satisfactory explanation of the fact that disseminated sclerosis, in many cases, seems to have its starting-point as the result of an acute febrile disease, mental strain, traumatic injury, chill, etc.—in other words, it accounts in a way that no other explanation seems to do for the fact that a great variety of different conditions may be followed by the development of disseminated sclerosis in apparently healthy (but in reality susceptible) persons, *i.e.* may apparently be the cause of the disease, or may aggravate its development when it has been previously present in a slight, unrecognised, or latent form.”

* “I have already stated that different observers take different views as to the starting-point of the lesion. Some—the majority—think that the lesion commences in the neuroglia or blood-vessels; others that it commences in the nerve elements themselves, and that the neuroglial tissue is secondarily affected.”

† “In two of my cases the disease developed in adult life, some symptoms (in one case difficulty in urination and difficulty in walking after over-exertion; and in the other case shaking of the head during urination and occasional shaking in the hands) had been present since childhood, and are suggestive that the disease was perhaps present in a latent form since childhood.”

WAR INJURIES OF THE EAR.

A RÉSUMÉ OF RECENT LITERATURE.

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I. INTRODUCTION.

IN this abstract it seems advisable to deal only with war injuries of the ear and to omit all reference to diseases of the organ of hearing, except in so far as the latter are the result of injury. At the same time it must be admitted that the great majority of ear cases seen by a specialist—at any rate by a specialist in this country—are not due to the war at all. The majority of the deaf soldiers are suffering from chronic purulent otitis media or from adhesive processes in the middle ear resulting from past attacks of middle-ear inflammation, while a few cases are due to otosclerosis or to nerve deafness of syphilitic origin. Most of these conditions have arisen in childhood, and the number of such cases is so great that it is permissible to hope that the attention of the authorities may be called to the urgent need for the better care of children suffering from inflammatory conditions of the middle ear. In many instances the deafness of the soldier is so great that the men should never have been accepted for active service. Indeed, a number of men have been returned from the front because of bad hearing.—Kerr Love (*Journal of the Royal Army Medical Corps*, November 1916, p. 649).

A description of war injuries of the ear written by a surgeon at a clearing station or a hospital near the front would differ very greatly from one written by a specialist attached to a base hospital, and still more from an account penned by an otologist at a military hospital in this country. The first would deal mainly with cases of severe wounds of the head involving the ear, due to fragments from bursting shells or bombs or to rifle bullets—injuries which are fatal in a very high percentage of cases. Of such injuries we have had far too few accounts, probably because the surgeons who deal with these severe cases have not the time to write about them. On the other hand, military otologists in this country see comparatively few of these cases, but have to deal with indirect injuries of the ear caused by explosions or loud noises, *i.e.* with “shell” or “explosion” deafness, or “noise” deafness.

According to Haymann (*Centralbl. f. Ohrenheilk.*, 1915, *passim*) injury to or destruction of the organ of hearing greatly reduces the earning power of the workman. Wounds of the ear may also lead to dangerous intracranial complications, for we now know that von Bergmann was wrong when he said that wounds caused by a modern

rifle bullet were sterile. Infected bullets cause suppuration, especially when they carry in infected clothes, hair, or skin. Secondary infection of the wounds is even more important than primary, *i.e.* bacteria can find their way to the injured middle ear from the nasopharynx *viâ* the Eustachian tube or from the external meatus through a rupture of the drumhead. Many of these cases of perforated drumhead, though really "acute," present the picture of a chronic middle-ear suppuration as regards the appearance of the membrane. When a case of direct injury of the head is admitted, the ear should be carefully inspected, and any escape of blood or cerebro-spinal fluid from the ear should be noted. The track of the bullet—as judged by the position of the wounds of entrance and exit—should be reconstructed and good radiograms (both lateral and antero-posterior) taken to reveal the presence of any foreign bodies or of splintering of the temporal bone.

II. THE EXTERNAL EAR AND MEATUS.

Auricle.—Canuyt (*Journ. de Méd. de Bordeaux*, April 1916) states that wounds of the pinna should be treated on general surgical principles, special care being taken to prevent perichondritis. Lacerations should be carefully stitched and plastic procedures carried out without delay. According to West (*Oxford War Primers*, 1915; Henry Frowde) there is good hope of the survival of an almost completely severed auricle, as the blood supply is abundant. Sutures should not penetrate the perichondrium but should go through skin only.

External Auditory Meatus.—Haymann states that the meatus may be injured by bullets which usually come from in front or from behind and make a fairly clean-cut hole with some splintering. The external meatus may also be injured by spent bullets or by pieces of shrapnel or bomb. In all of these cases the facial nerve is frequently injured. The prognosis in cases of injury to the meatus only is good, but stricture or atresia is a not uncommon sequela. A bullet in the meatus or its neighbourhood may keep up suppurative otitis, while if the foreign body be removed fatal meningitis may follow. In injuries of the external meatus the middle cranial fossa is more frequently involved than the anterior or posterior fossæ. According to West, direct wounds of the bony portion of the meatus are usually at once fatal unless the bullet be a spent one, when it may lodge in the petrous bone. Such wounds are *especially serious if complicated by antecedent middle-ear suppuration*. In such cases the radical mastoid operation should be at once performed. Contraction or stenosis of the meatus following wounds are best treated by a planned plastic operation after all is soundly healed. Fractures of the roof of the meatus, which are usually compound, should be treated by careful drying of the passage and insufflation of boric powder. A dry dressing is then applied. The ear should never be syringed.

III. THE MIDDLE EAR.

Drumhead.—Rupture of the tympanic membrane is a fairly common war injury, and generally results from the explosion of a shell or bomb close to the sufferer. The lesion may be due to the sudden great increase of pressure which occurs first of all, or to the rapidly following negative pressure (Haymann). The effect of the explosion varies with its distance from the ear, the size of the shell, and the nature of the explosive. Lermoyez (*La Presse Méd.*, 25th February 1915) says that the effects of explosion are far greater in a trench than in the open field. Further conditions predisposing to injury of the middle-ear structures are a wide straight external meatus, a drumhead almost at right angles to the meatus, or one which is indrawn or cicatricial. If the Eustachian tube is obstructed or if the explosion is unexpected the injurious effects are more severe. Ruptures of the tympanic membrane brought about in this way are much less regular in shape and position than those familiar in civil life, *i.e.* those due to a "box on the ear." Japanese otologists have found that in 50 per cent. of cases the rupture is in the posterior part, in 24 per cent. in the anterior part, and in 26 per cent. along the handle of the malleus. The tears are often extensive, and may give rise to the impression of actual loss of substance. The symptoms are slight bleeding from the ear, followed by serous discharge; there is also deafness and frequently vertigo and pulsating tinnitus. (The latter symptoms are, however, due to a concomitant lesion of the inner ear.) The question of infection is even more important than that of rupture of the drumhead. Haymann has found that middle-ear suppuration almost always results in such cases, as the tympanic mucosa has only a small power of resistance. In extreme cases of concussion due to shell explosion, the joint between the malleus and incus may be dislocated and the latter bone displaced backwards towards the mastoid antrum. The treatment of traumatic ruptures of the tympanic membrane consists in careful dry cleansing of the external meatus and packing with a strip of iodoform gauze. If the inner ear is not injured the prognosis as regards hearing is good. If purulent otitis media arises it is probably best to treat it by the dry method.

Middle-Ear Cleft.—Injuries of the *Eustachian tube* are seldom observed or, at least, recognised. They may be caused by bullets entering through the facial bones with an oblique direction, or by bullets entering near the external meatus and penetrating to the region of the tonsil. The signs of tubal closure are observed, and may be followed by otitis media. Direct wounds of the middle ear always lead to extensive injury—usually to comminuted fracture of the petrous bone. It is only in rare cases that the middle ear alone is injured, and even then suppurative otitis media—usually of long duration—almost

invariably follows. Frequently there is extensive splintering of the bone in the neighbourhood of the channel of passage of the bullet. The tympanic membrane and ossicles are torn or destroyed, and there is extensive hæmorrhage into the drum cavity and antrum. The facial nerve is usually involved, along with the tympanic plexus and the chorda tympani. In many of these cases the inner ear is also involved, and the lesion may extend to the internal auditory meatus or the pons Varolii. As a rule, a modern rifle bullet fired at a distance of less than 2000 yards goes right through the head (Haymann). In some cases the bullet may pass from one mastoid to the other without killing the patient, and even apparently without doing much damage to the brain. In such cases the bullet probably passes over the tentorium between the occipital lobes and the cerebellum. Direct injuries of the middle ear may extend upwards to the middle cranial fossa and downward to the jugular bulb. Posteriorly the facial nerve, the mastoid and the sigmoid sinus may be injured, while anteriorly the internal carotid artery and the Eustachian tube may be shattered. As a rule the whole posterior part of the middle-ear cleft is involved, but in rare cases a small splinter only may enter the tympanic cavity, while isolated injury of the mastoid process by fragments of shell or bomb is not uncommon. Such fragments usually give rise to suppurative otitis media, which only ceases after the removal of all foreign bodies. It rarely happens that fragments can remain in the mastoid without causing serious reaction. Surface injuries of the mastoid may involve the emissary vein and may result in septic thrombosis of the sigmoid sinus. The mastoid process may be injured by shots from all directions. In many cases the bullet enters through the orbit or cheek and leaves by the mastoid, but in these cases the mastoid injury is comparatively of small importance. According to Haymann the velocity of the bullet and the structure of the mastoid (pneumatic or sclerotic) have a great effect on the resulting lesion. Concussion of the labyrinth may result from injuries of the mastoid, and facial paralysis is of common occurrence.

Treatment.—If the patient survives the immediate injury to the ear, the only urgent need, according to West, is the control of hæmorrhage. When this is venous it is easily managed by careful gauze plugging. If, on the other hand, the blood comes from the internal carotid the only chance for the patient's life lies in the control of the artery in the neck until it can be ligatured. The plug of iodoform gauze introduced in cases without dangerous bleeding should not be removed for 48 hours (Lermoyez). At the end of this period the meatus should be carefully cleansed with pellets of dry cotton-wool, the plug of gauze reinserted, and dressings applied. Syringing should be avoided. Opinions are divided on the question of operation when the X-rays reveal a bullet or piece of shell in the middle-ear cavities.

The interventionists think that an immediate search for the foreign body should be carried out to obviate the danger of intracranial complications. The abstentionists prefer to wait, so as to avoid unnecessary risk. Lemée holds that we should wait if the wound be recent, but operate at once if otorrhœa or intracranial complications be present. If the facial nerve be paralysed the ends should be placed in contact but not stitched (Canuyt). The intracranial complications following shot injuries of the middle ear are the same as those due to middle-ear suppuration arising from other causes. Labyrinthitis and purulent leptomeningitis are the most common, but extradural abscess, sigmoid sinus thrombosis or septicæmia, and brain abscess (temporo-sphenoidal or cerebellar) may also occur.

IV. THE LABYRINTH.

War injuries of the labyrinth may be classified as follows:—(A) Direct injury due to bullets or fragments of shell or bomb. (B) Indirect injury in fractures of the skull which involve the labyrinth capsule. (C) “Noise” deafness, which is especially seen in artillerymen and naval gunners, but also occurs in other soldiers and sailors to a less extent. (D) “Shell” or “explosion” deafness, due to the bursting of mines, shells, or bombs close to the soldier.

(A) *Direct Injury of the Labyrinth*.—In the great majority of cases in which the labyrinth is involved the soldier is killed outright from the concomitant lesion of the brain. Such cases, of course, do not come under clinical observation. Haymann states that injuries of the labyrinth are almost always combined with lesions of the middle ear. In rare cases, however, the bullet may enter through the face and reach the labyrinth without penetrating into the middle ear. There is usually extensive fissuring or splintering of the petrous bone, often followed by intracranial complications. As a rule, the whole labyrinth is involved. The bullet may come (1) from above and in front with a downward and backward direction. (2) From in front, against the face, injuring the eye and maxillary antrum or the mouth before reaching the labyrinth. The wound of exit may be in the mastoid, in the occipital region, or in the neck on the same side, or on the opposite side. The bullet may, of course, remain in the skull. (3) The most frequent injuries of the labyrinth which can be recognised result from lateral wounds penetrating the ear or its neighbourhood. (4) In some cases the shot is an oblique one, the bullet entering in front of the ear and coming out in the neighbourhood of the mastoid process. The symptoms of labyrinth injury are well known—deafness, tinnitus, giddiness, disturbance of balancing, vomiting, nystagmus, etc. According to Lermoyez, in the severely wounded cases which survive, the deafness is only noted when the bandages are removed. Haymann states that in 50 per cent. of these cases death occurs later from septic

meningitis, which may be due to infection carried in by the bullet or shell splinter, or may be secondary to infection from the Eustachian tube. The onset of meningitis may be delayed as long as six weeks. Bullets and bits of shell may remain a long time in the labyrinth without giving rise to severe complications, and they may even heal in this situation, if the middle ear be not injured (Haymann). On the other hand, these foreign bodies usually give rise to pain, which is only relieved by their removal. Some surgeons hold that it is better to wait, while others believe that an immediate exploratory operation should be carried out for fear of intracranial complications. Lermoyez himself holds that it is better to wait if the wound be recent and aseptic, but to operate at once if otorrhœa be present. Further, if facial paralysis, labyrinthine disturbance, or meningitis exist, one should operate at once.

(B) *Indirect Injury of the Labyrinth in Fracture of the Skull.*—The labyrinth may be indirectly injured by blows on the head from a rifle butt or sword, or by shot-wounds of the head or face, especially by those which involve the lower jaw, which, of course, articulates with temporal bone. Falls on the head may cause fracture of the base, and thus injure the inner ear. Haymann states that basal fractures may run parallel to the long axis of the petrous pyramid or may cross it. (1) *If the force is applied at the side of the head in the direction of the petrous pyramid we get a longitudinal fracture, which usually runs along the roof of the middle-ear cleft.* At its outer end the line of fracture may turn outwards to the external meatus, or may pass to the squamous or mastoid regions. As a rule, in these cases the labyrinth capsule remains intact, but the stapes may be displaced, or there may be hæmorrhage or tearing of the round window membrane. (2) *On the other hand, if the force is applied to the back of the head, we get a transverse fracture which runs at right angles to the long axis of the petrous pyramid and always injures the labyrinth.* As a rule, these fractures pass through the vestibule. The symptoms of such injuries are extreme or total deafness, marked disturbance of balancing, with loss of the cochlear and vestibular functions. *If the labyrinth be injured there is an escape of cerebro-spinal fluid from the ear along with blood.* In the cases in which the labyrinth capsule is not injured there is no escape of cerebro-spinal fluid; but, nevertheless, deafness results from hæmorrhage into—or tearing of—the eighth nerve. On lumbar puncture blood may be present in the cerebro-spinal fluid (Ferreri). One or two of the cases with fracture of the labyrinth have been microscopically examined many years after the accident, and filling up of the hollow spaces of the labyrinth by new connective tissue and bone has been found, along with secondary degenerative atrophy of the nerve structures.

(C) and (D) “*Noise*” Deafness and “*Shell*” or “*Explosion*” Deafness.

—It is difficult or impossible to draw a sharp line between “noise” and “explosion” deafness. Undoubtedly, there are many cases in civil life of pure noise deafness due to *prolonged over-stimulation of the auditory nerve endings*, e.g. in boilermakers, riveters, railwaymen, etc. On the other hand, there are in war many cases of pure explosion deafness due to the bursting of a shell or bomb close to the soldier, and the consequent great variation in air-pressure which produces a *coarse mechanical effect* on the labyrinthine structure (Haymann). There is, however, a third group in which both elements are present, i.e. the acoustic over-stimulation and the mechanical injury. Such conditions are found in artillerymen, naval gunners, and other members of the forces.

(C) “Noise” Deafness.—Wittmaack (*Zeitschr. f. Ohrenheilk.*, 1907, vol. liv.) was the first to show that continuous noise conveyed to the ear by air- or bone-conduction did not cause hæmorrhage or tearing of the membranous labyrinth, but produced a degenerative neuritis in the cochlear apparatus. The vestibular apparatus showed no change. According to Wittmaack the primary changes occurred in the spiral ganglion and nerve, while those in Corti’s organ were only secondary. Yoshii (*Zeitschr. f. Ohrenheilk.*, 1909, vol. lviii.), on repeating Wittmaack’s experiments, found that Corti’s organ was affected first of all, and that the degenerative changes in the cochlear ganglion and nerve followed later. Gruenberg, von Eicken, Marx, and Roehr have confirmed the observations of the Japanese otologist. Hoessli (*Monatschr. f. Ohrenheilk.*, year 47, No. 7) considers that the changes due to noise are caused by excessive stimulation of the nerve-endings, like those produced in the retina by an intensely bright light (eclipse blindness). Both von Eicken (*Verhandl. der deut. otol. Gesellsch.*, 1909, vol. xviii.) and Hoessli came to the conclusion that air-conduction of sound was much more effective than bone-conduction in producing injuries of the inner ear. After prolonged exposure to the sound of rifle- and gun-fire, deafness is usually marked and tinnitus not uncommon. Vestibular symptoms are rare. Patients complain of a feeling of heat in the ear or of drumming in the head. Prophylaxis and treatment are dealt with later.

(D) “Shell” or “Explosion” Deafness.—The pathology of explosion or shell deafness is still very vague. As yet, we have no published accounts of the microscopic examination of the ear from such cases. Theories as to the pathology may be divided into three groups—(a) Some otologists believe that there are changes in the membranous labyrinth of a molecular nature leading to degenerative neuritis affecting the nerve-endings, ganglia, etc. (b) Others hold that the membranous labyrinth is torn (Stenger, Barnick, and Sakai), and that hæmorrhages occur. Yoshii found that explosions produced close to the ears of animals caused rupture of the drumhead and hæmor-

rhages in the cochlear and vestibular apparatus. Hoessli caused explosions at a great distance from the animals, and did not find rupture or hæmorrhage, but noted changes in Corti's organ, the cells of which were shrunk and flattened as from excessive movements of the basilar and tectorial membranes. (c) Zange has experimented on animals, but has found no changes in the labyrinth. He therefore believes that the condition is due to small hæmorrhages in the pons, medulla, and cerebellum.

Clinical Aspect of "Shell" Deafness.—Haymann calls attention to the injurious effects of long-continued shelling on the soldiers exposed to it. The effects of the shell explosion depend on the calibre of the shell, its explosive force, its distance from the soldier, and the angle at which the explosion meets the ear. The weather and the conditions of resonance must also be considered as well as the nature of the gas which results from the explosion. Lermoyez holds that the results are much more severe if the explosion occurs in a more or less enclosed space, such as a trench, where the force of the explosion and the gas are not quickly dissipated. The direction of the wind, and the humidity and electrical tension of the air must also be considered.

In the bursting of shells and grenades the great variations of air-pressure are the cause of the damage to the inner ear. The explosion produces a coarse mechanical effect, *i.e.* a blow which reaches the ear before the noise of the explosion, so that, to some extent, there occurs an arrest of the stapes comparable to that produced by Gelle's experiment. Injuries to the labyrinth due to rifles being fired off close to the ear are also of a mechanical nature. During the firing of big guns the shaking of the ground is transmitted by bone-conduction to the labyrinth, though the great differences in the density and nature of the body tissues must make a bad conducting medium. Some observers say that a middle-ear lesion guards the inner ear from injury, while others hold the view that the two tympanic muscles in health act as a protection. If the drumhead remains intact the injury produced by an explosion is more severe than when the membrane gives way, because of the powerful lever action on the stapes. If the drumhead ruptures, the round window is, of course, affected, but to a less extent.

The clinical symptoms of labyrinthine injury are divided into three groups (Haymann)—(1) Those due to injury of the *cochlear apparatus*, *i.e.* deafness and noises in the ear. (2) Those due to injury of the *vestibular apparatus*, *i.e.* giddiness, loss of balancing, nystagmus, etc. (3) *Cerebral or psychological disturbances*, *i.e.* loss of consciousness, headache, nausea, vomiting, vasomotor disturbances, neurasthenia, and hysteria. Two types of cases are met with—(a) *Acute cases*, due to intense and sudden trauma. In these we meet with cochlear, vestibular, and psychic disturbances. (b) *Chronic cases*, due to milder but frequently

repeated injuries, in which only the delicate cochlear apparatus is involved. When a bomb explodes close to a soldier there is loss of consciousness for a longer or shorter period, varying from a few seconds up to some hours. After recovery of consciousness there is more or less deafness — usually unilateral. Along with this there is nausea, vomiting, giddiness, and disturbance of balancing. Tinnitus comes on at once, and the patient also complains of pain or of a numb feeling in the ear, with headache. There is also marked psychic depression. Lermoyez describes the condition very graphically.—A shell bursts, and, though no projectile has wounded the petrous bone, and no blow has injured the skull, the ear dies. It is not due to the noise, but to the sudden displacement of air, which strikes against the tympanic membrane and causes the injury. The bursting of a shell can affect the ear in two different ways—(a) The intense noise puts the auditory apparatus into an exaggerated state of vibration, and temporarily paralyses it. A sudden light injures the retina in a similar way. A functional deafness is produced, but it disappears in a few days. (b) An explosion causes the air to be violently projected into the external auditory meatus, just as earth might be shot up. The condensed air presses on the tympanic membrane, which transmits the pressure to the labyrinth. (The membrane and ossicles transform vibrations of the drumhead, which are of great amplitude but slight force, into movements of the stapes, which are of small amplitude but of great force, in order to overcome the inertia of the fluid in the labyrinth.) This sudden condensation of air is comparable with, though enormously greater than, the effect produced by a smack on the ear, and is especially the result of explosions in an enclosed space. This type of deafness is frequently observed after the bursting of bombs in the trenches rather than in the open field. The result of the explosion varies according to whether the tympanic membrane resists or gives way. In the latter case the effects are less severe.

If the drumhead resists, the force of the explosion is transmitted thirty-fold by the stapes to the perilymph, producing labyrinthine concussion, such as we find after violent injuries of the skull. The auditory and static labyrinths are both involved, and the patient, on regaining consciousness, suffers from deafness, tinnitus, and vertigo. The prognosis depends on the degree of violence and proximity of the explosion, and on the formation and condition of the external meatus, *e.g.* a narrow curved meatus, containing a plug of wax, would protect the ear to a great extent. Further, if the soldier expects the explosion, being warned of the arrival of the shell by the increasing “whizzing” sound, he prepares himself for the noise—opens his mouth and unconsciously tightens his tympanic membrane.

From the clinical point of view, Lermoyez distinguishes two degrees of labyrinthine concussion—mild and severe. In a “mild” case, taken

unawares by the explosion, the subject feels stunned at first ; when his astonishment has passed he feels in one or both ears an uncomfortable sensation of fulness ; it seems to him as if there is at the bottom of the meatus a plug of thick cotton-wool which veils sounds, and which he tries to get rid of by manipulating his auditory meatus with his finger ; at the same time he perceives a musical noise, like a swarm of mosquitoes, which at first he erroneously thinks comes from outside, but which eventually he localises as being in his ear. Often he notices that his gait is uncertain ; when he turns his head a feeling of giddiness just fails to make him fall down. There is no discharge from the ear, no pain, no lesion visible by the aural speculum. This condition lasts several days, sometimes several weeks ; the giddiness disappears first ; then the hearing returns, but the musical tinnitus may persist indefinitely. Local treatment is useless ; but the patient must be kept absolutely quiet and in silence as long as the ear shows signs of hyperæsthesia. Bromides should be given. These "slightly wounded soldiers" can return to duty after about a month, but the susceptible ear must be carefully plugged.

In "severe labyrinthine concussion" a mine explodes and the man falls unconscious. Coming to himself he tries to get up, but falls again. He has to be assisted to his feet and held up, as he feels drunk or stupefied. Everything about him seems to turn, and he suffers from nausea and vomiting. For several days the patient remains silent and nervous. The slightest movement of his head, or even the sight of anything moving, brings on vertigo, cold sweats, nausea, and epigastric pain. No food is tolerated. At the end of a week the vertigo is less and the patient can sit up, or even get up, though he has to walk holding on to objects for support. He is now chiefly concerned about his deafness, which is usually unilateral, but so severe that he cannot hear a shout in the affected ear, though his head seems full of the noise of whistling and bells. On examination, hæmorrhagic spots may be seen on the tympanic membrane, suggesting that hæmorrhages have also occurred in the internal ear.

Functional Examination of Cases of "Shell" Deafness.—Neumann (*Monatschr. f. Ohrenheilk.*, 1915, p. 211) has examined 152 patients about a month after the explosion. He found that one ear was almost or quite deaf, while the other showed considerable loss of hearing. The bone-conduction was shortened, the lower tone-limit slightly raised, but the upper tone-limit markedly lowered. Spontaneous nystagmus was rarely present one month after the injury, and the vestibular reactions were usually normal. Neumann thinks that the injury is due to excessive stimulation of the auditory apparatus. Rhese states that 50 per cent. of cases of labyrinth concussion improve within a year. Meyer has reported on 105 cases of war injury of the inner ear due to a sudden great increase in air-pressure. In 70 the

drumhead was injured in addition to the labyrinth trouble. Ninety-five of the patients suffered from "detonation neuritis." The deafness was so great that the patients could not understand what was said, but there were no cases of complete deafness.

Prognosis, Prophylaxis, and Treatment (Lermoyez).—The vertigo disappears in from three to six months at most, though sudden turning movements, or looking down from a height, still cause great disturbance of equilibrium. The tinnitus decreases but does not disappear, and the deafness persists. Sometimes there are merely gaps in the scale of hearing, *e.g.* high tones, such as the whistling of birds, are no longer heard. The prognosis should always be guarded, as the deafness, which at first is partial, may later become complete (Haymann).

Prophylaxis.—With regard to the use of aural plugs, Suzuki holds that a preventive appliance which is to be used by several thousand men must not be of a complicated nature. Cotton-wool, however, is not efficient unless it be incorporated with jeweller's wax or plasticine. Such a plug is easy to insert and remove intact, and can be readily moulded to fit the external meatus. Arnulph Mallock (*Brit. Med. Journ.*, 1915, vol. i. p. 25) has invented an ear defender, which consists of a cylindrical ebonite holder and seven components, the sensitive diaphragm, enclosed between two pieces of wire gauze, being the most important. The "defender" transmits ordinary sounds freely, but a sudden extreme change of air-pressure—as from an explosion or gun-fire—presses the diaphragm against the gauze and prevents injury to the labyrinth.

Treatment.—Immediately after the injury the patient should be removed on a stretcher with great care, and put to bed in a cool, silent, and dark place. The patient himself chooses the position (supine, prone, or on his side) in which the vertigo and nystagmus are least marked. The treatment is really the same as that after a long administration of chloroform, which itself causes intoxication of the labyrinth (Lermoyez). To relieve the thirst a few teaspoonfuls of iced water may be given, but as seldom as possible. A mustard plaster or a hot compress should be applied over the epigastrium to relieve the nausea, while an ice-bag, guarded by a layer of flannel, may be placed over the ear. If the patient complains of buzzing, two leeches may be applied behind the ear. A hypodermic of morphia may be given, and repeated morning and evening for two or three days. In severe cases Ferreri recommends lumbar puncture. Thereafter, bromide of potassium should be prescribed. In the treatment of deafness Lermoyez recommends large doses of strychnine hypodermically (2 mgrms. three times a day for a fortnight, not longer). Electricity is of no use. Later on an artificial aid to hearing may be tried, but lip-reading is likely to be of much greater service. (One notes with pleasure the proposed

establishment in Edinburgh of a centre for teaching lip-reading to deaf soldiers.—Abs.)

V. PSYCHICAL DEAFNESS.

Milligan and Westmacott (*Journ. of Laryngology*, 1915, p. 302) believe that many cases of so-called "concussion deafness" are due to the temporary abolition of sensory impulses in a brain already anæmic as a result of physical fatigue and mental strain. The actual loss of hearing is induced by a sudden climax, *e.g.* the bursting of a shell, accompanied as it is by general atmospheric commotion, and the not infrequent burial of the soldier in the earthworks of the trench. The writers have observed ten cases of the "deaf and dumb" state, and believe that the abrogation of function is due, not to an organic lesion, but to a temporary suspension of neuron impulses from the higher cortical cells to the periphery. They state that in cases of sudden blindness and sudden deafness no trace of any peripheral organic lesion can be demonstrated. Moreover, the rapid recovery of so many of the patients is a strong argument against any peripheral lesion. In many of the cases the ears were previously diseased, and Milligan and Westmacott believe that this has tended to throw the effects of the concussion on the sentient segments of the organ of hearing. Canuyt (*Journ. de Méd. de Bordeaux*, April 1916) states that in the diagnosis of purely functional lesions the principal signs are—absolute deafness; total loss of hearing for the tuning-fork by air- or bone-conduction; retention of the patient's natural tone of voice; absence of spontaneous nystagmus. Neuropathic symptoms may be present, *e.g.* tremors, disturbance of sensibility, narrowing of the visual fields, hysterogenic zones, along with the exaggeration and self-contradiction characteristic of hysteria. Urbantschitsch (*Monatschr. f. Ohrenheilk.*, 1914, p. 1206) records a case of the deaf and dumb state following shell explosion in which the patient emitted one tone continuously day and night. Massage proved useless, but a strong faradic current applied to both ears brought back some hearing, while similar applications to the larynx resulted in a return of the voice. Zange (*Muench. med. Wochenschr.*, 1915, p. 957) reports a somewhat similar case in which the speech returned to some extent after ten days, but the patient stuttered and spoke in a telegraphic style. Caloric tests were carried out, but produced crying. The patient almost completely recovered in some months. Various methods have been tried in the treatment of these cases of psychic deafness which are often accompanied by dumbness. Massage, electricity, the administration of an anæsthetic followed by stimulation, and the use of asafoetida and valerian may be mentioned. O'Malley recommends that one ear should be syringed with cold lotion so as to produce caloric nystagmus and giddiness. The surgeon then says to the patient, "Now you hear all right; don't you?" As a rule,

the patient answers that he does. O'Malley believes that by influencing the lower vestibular organ in this way one can restore the function of the more highly developed cochlear apparatus. As a rule, bullying methods are better avoided. It must be remembered that the patients are suffering from great psychic disturbance, and that they need rest and quiet more than anything else. They should be made to understand that their deafness is not permanent, and that the power of hearing may return any day.

VI. AFFECTIONS OF THE EAR IN AVIATORS.

Ferreri (*Policlinico*, 1915) states that on rising rapidly, or on rising to a very great height, aviators experience a feeling of deafness and pressure in the ears, along with tinnitus. There may even be vertigo and nausea, so that in severe cases Ménière's symptom-complex may be met with. The condition is due to a want of proper balance between the air-pressure in the tympanic cavity and that in the external meatus. This want of balance reacts on the labyrinth. In Ferreri's opinion all pilots and observers should be examined for nasal obstruction, and the condition of the Eustachian tubes investigated. In the treatment of the conditions Ferreri advises rest, pilocarpine injections, and, in severe cases, lumbar puncture.

FOOTNOTES TO MEDICAL HISTORY.

THE following notes were written about the year 1881: *The Sketch of the Edinburgh Medical School*, by Dr. Robert Goodsir, a brother of John Goodsir, the anatomist; *The Recollections of Professor Syme*, by Dr. William A. Finlay of Trinity, a brother of the present Lord Chancellor. Although they were not originally intended for publication, we offer them to our readers as personal recollections that are not without interest and historical value. We are indebted to Mr. Charles W. Cathcart for permission to publish them.

I. BRIEF SKETCH OF THE EDINBURGH MEDICAL SCHOOL FROM THE YEAR 1834 TO THE YEAR 1838.

In the year 1834, when the writer of this notice began to study medicine in the University of Edinburgh, the chairs had come to be regarded by their occupants in the same light as a family estate, which they had the right to transmit from father to son or other relative. And notwithstanding all the reforms that have been made within recent years in regard to medical education, this system has not been altogether abandoned. The evil of this system must be very evident, for of all things in this world the least hereditary are genius and talent. And the consequence, so far as the Edinburgh Medical School was concerned, was that its fame for several years—that is to say, from the time of Dr. Cullen, Dr. Gregory, and Dr. Black—had been gradually diminishing.

The Anatomy chair had been held by three generations of Monroes, the Midwifery by two generations of Hamiltons, and the Practice of Physic chair by two generations of Homes. Now, with regard to the second Monro, who had passed from the scene long previous to the year 1834, and also in regard to the second Dr. Hamilton, under whom the writer of this sketch had the advantage of studying, it would not, perhaps, have been possible to find two men more eminently qualified to teach the subjects which they respectively represented.

With regard to others of these professors by inheritance the case was different. One of these, I may be allowed to state without offence, had arrived at an age when it was impossible for any human being to be capable of lecturing with any advantage to a class.

The enunciation of the professor was so indistinct that he could not be properly understood. The attendance of the class was of the most meagre description, as the students were in the habit of substituting any amount of presence cards. The uproar in the class-room was occasionally very violent. Showers of peas rattled against the walls and windows.

Edward Forbes and others of a more literary turn utilised the time in the perusal of magazines and books; and for those of a less literary turn of mind amusement was provided, and the dreary monotony of the lecture relieved by the noise of trumps and pocket-harps and harmoniums and various other portable instruments, which resounded sometimes in harmony, but in other cases in the most fearful discord, from various parts of the class-room. These circumstances are apt to pass into oblivion, but the evil that results is incalculable. The student is obliged to pay down in hard cash for this burlesque of a lecture; his time—more precious at that time of his life than all the gold in the universe—is completely wasted, and, worst of all, he is sent into the world completely destitute of that knowledge which might otherwise have been so useful both to himself and his patients. The writer of this notice has had reason to regret this great deficiency in medical instruction through a long lifetime. No wonder that the fame of the Edinburgh Medical School had for years been steadily diminishing.

But the incapacity within the walls of the University was amply compensated by the ability of the Extra-Mural Lecturer.

Dr. Knox was then about the zenith of his fame as a lecturer upon Anatomy. Mr. Fergusson occasionally gave demonstrations in the same rooms, but always on the subject of lithotomy; while Dr. John Reid laboured in the same rooms as the regular Demonstrator to Dr. Knox.

The medical school in Argyle Square was likewise very ably conducted. Its principal ornament was Dr. M'Intosh, who lectured on the subject of Practice of Physic; he was deservedly a most popular and eloquent lecturer, and his class was always very numerous. In this school of medicine lectured also Dr. Alexander Syme on the subject of Anatomy. He afterwards obtained the chair of Anatomy in Aberdeen.* I have no doubt this must have been a sad disappointment to Dr. Knox of Surgeons' Square rooms, who seemed to consider himself as born for a professorship, and made several ineffectual attempts to get himself installed as a professor. But the remembrance of the Burke and Hare murders, I have no doubt, operated greatly to his prejudice; for, otherwise, there can be no doubt that Dr. Knox was a most able and efficient lecturer in Anatomy—general, special, and comparative. The circumstance above alluded to no doubt operated to the prejudice of Mr., afterwards Professor Sir William Fergusson. Mr. Fergusson, however, notwithstanding all the influence employed against him, succeeded in getting the appointment of Assistant-Surgeon in the Old Infirmary. And there it was that he was enabled to display that unrivalled operating dexterity on the same platform as his still more distinguished friend, Mr. Liston, had occupied.

* We have been unable to verify these statements. Dr. M'Intosh and James Syme lectured together, but at *Brown's Square*, up to 1826.—(Ed.)

Mr. Liston, in the year 1834, when the writer of this notice began to study, had been removed to London to occupy the chair of Clinical Surgery in the University College. And from the same Old Infirmary Mr. Fergusson was transferred to the Clinical Surgery chair in King's College, London. There can be no doubt that Mr. Fergusson was a most ardent admirer of Mr. Liston as a surgeon. In his book on *Surgery* he tells us so. And likewise in his lectures he always spoke of his friend Mr. Liston, as he called him, in the very warmest terms. He certainly, so far as operating was concerned, could not have followed a more admirable model from all I have heard. But when he further followed him in his style of lecturing, this was quite a different matter. From all we heard, Mr. Liston's style of lecturing and of explaining the surgical procedure after an operation was of the most abrupt and desultory character, although, we believe, most eminently practical. Sir William Fergusson preserved the Listonic style of illustrating his operations to the very last. A twitch of the left thumb over the left shoulder, in the direction of the operating-table, and a jerk of the head in the same direction, seemed designed to convey to the student the whole history of any operation, however complicated.

There can be no doubt, however, that Mr. Liston is the great founder of the Modern School of Scottish Surgery. He had improved whatever opportunities he had enjoyed in Edinburgh of perfecting his knowledge in surgery by following the courses in the London Hospital under Sir William Blizard. Even Mr. Syme was in the habit of stating that when Mr. Liston performed his first operation for lithotomy he himself held the staff. This, of course, was after a reconciliation between these two surgeons had taken place.* In regard to the operation of lithotomy I fancy that to Mr. Liston must be attributed the merit of introducing the knife usually now in use for that operation as a substitute for the clumsy and somewhat dangerous instrument that had previously been in use. This of itself was an immense step in advance.

To Mr. Liston must likewise be attributed the merit of introducing the method of transfixion in amputations in preference to that of the circular incision. In fact, I have always thought the circular method was much too hastily abandoned in Scotland in deference to the great influence exercised by Mr. Liston. I have over and over again witnessed circular operations performed by M. Roux of Paris in a manner far excelling anything I have witnessed by the method of transfixion.

* The writer is evidently mistaken ; it was before the quarrel. The misunderstanding between Liston and Syme began about 1823, and the reconciliation took place in 1839. The two met only once after this—a few months before Liston's sudden death in 1847.—(Ed.)

Mr. Liston, to his accomplishments as a most dexterous operator added also that of being a most daring rider in the hunting field, which amusement, I understand, he prosecuted with the object of giving himself nerve. In this practice he was imitated and followed by Mr. John Lizars, the teacher of Surgery in the Argyle Square school of medicine, whom we remember to have seen amputating a leg at the place of election the very next day after fracturing his right collar bone by a heavy fall in the hunting field.

The clinical visit of Mr. Syme to the hospital was always most densely crowded by students; in order to observe any particular case it became necessary to take up a position at the bedside of the patient some time previous to the time Mr. Syme reached it. By this manœuvre many cases had to be missed, until a similar advantageous position could be commanded a little further on. In this way many very important cases were missed altogether. Nothing could exceed the clearness, conciseness, and practical tendency of Mr. Syme's remarks at the bedside of the patient and also in his clinical lecture.

I may recall two incidents in the surgical practice of Mr. Syme. He went in very strongly for those nervous disorders as affecting surgical complaints. This subject had first been brought to the notice of the profession by Sir Benjamin Brodie, of whom, by-the-bye, Mr. Syme was a great admirer.

On one occasion a patient came into the wards of Mr. Syme insisting most positively that he had swallowed a frog, and that it was giving rise to a series of very disagreeable sensations. To satisfy his mind Mr. Syme administered to the patient a powerful purgative draught, and at the same time had a live frog introduced into the chamber utensil. The patient was not long in discovering what he considered to be the cause of all his uneasiness; his mind was relieved from its apprehensions, and he left the hospital quite satisfied.

On another occasion a young female, a domestic servant, came into Mr. Syme's wards asserting, most positively, that she had swallowed a padlock. Mr. Syme gave a long clinical lecture upon the case, and, giving it as his opinion that this was one of those nervous disorders described by Sir Benjamin Brodie, that there was no reality in the girl's statement that she had swallowed a padlock, in fact, that it was all mere fancy, and he accordingly dismissed the case. Mr. John Lizars, however, the Professor of Surgery to the Royal College of Surgeons, had apparently been watching the case, and seized the patient the moment she was dismissed from Mr. Syme's ward and transferred her to his own. During the middle of the night the patient was seized with a violent fit of coughing. She felt some object disengage itself and move about in her throat. She sent for the house surgeon, who introduced a pair of long forceps into her throat, and fished out the identical padlock that the girl had swallowed.

Besides his skill as a surgeon, Mr. Syme had given his attention to other departments of medical education, and was not unfrequently called upon to examine intending graduates on the subjects of Botany, Chemistry, etc. Besides, I heard Dr. David Boswell Reid declare in his public lectures that Mr. Syme was the real inventor of the mackintosh waterproof cloth now so much in use in our moist climate.

Any notice of the Edinburgh Medical School would be incomplete without some reference to Dr. John Thomson, the Professor of Pathology during the period under review, who exercised such a powerful influence over its fortunes. By Dr. Knox of the Surgeons' Square rooms he was styled "the Chairmaker," and never was an appellation more richly deserved or more universally approved and adopted. From a comparatively obscure origin in Paisley he came to exercise a great influence with the Whig ministry of the day in the direction of the extension of medical education, at the expense of the time and money of the medical student, by the institution of new chairs. Some of these chairs have now been very properly abolished. I am not altogether certain whether or not it was by the influence of Dr. John Thomson that the chairs of Systematic Surgery and Clinical Surgery were instituted. The subject of systematic surgery had previously been conjoined with that of anatomy under Dr. Alexander Monro. This professor was in the habit of exhibiting in his lecture on anatomy the apparatus he used to illustrate his lectures on surgery, and certainly it would be impossible to conceive anything more awkward and clumsy. If this apparatus in surgery can be regarded as a fair state of the art in the year 1834, verily they should be disinterred from their repository and exhibited as a proof of the improvements in surgery within the last fifty years. But I rather think that the apparatus exhibited by Dr. Alexander Monro, *tertius*, was the very same that had been exhibited by his grandfather at the very commencement of the Edinburgh Medical School.

But Dr. John Thomson had been at the wars, for he had sufficient interest to get himself appointed a kind of army functionary; and after the battle of Waterloo he had an opportunity of attending the sick and wounded. So he conceived the idea of a chair being instituted for the teaching of Military Surgery. But Dr. Thomson, with all his skill in managing men, does not seem to have been destined to shine in surgery. The cause is fully related by Dr. John Thomson's own son, Dr. William Thomson, in his *Life of Dr. Cullen*, where the circumstances of Dr. Thomson's change of his field of practice are related at length. Mr. Syme was in the habit of stating in his lectures that a physician might commit any amount of blunders in the treatment of a medical case; whereas the slightest error on the part of the surgeon is apparent and cognizable by all, the errors of the physician are buried

with the patient. The circumstance that occasioned Dr. John Thomson's change of field of labour was the following simple reason:—Dr. John operated in a case of supposed lithotomy and failed to find a stone.

I have reason to believe that Dr. John Thomson had interest sufficient to get the chair of General Pathology instituted in the University of Edinburgh, which he filled, first in his own person and afterwards by his substitute, Dr. James Young Simpson, afterwards the celebrated obstetrician. The chair of Anatomy in Aberdeen was secured for Dr. John Thomson's son, Dr. Allan Thomson, who died in London so very recently. From Aberdeen Dr. Allan Thomson was transferred to the Physiology chair in Edinburgh, vacated by Dr. Alison, promoted to the Practice of Physic chair. From this chair Dr. Allan Thomson was transferred to the Anatomy professorship in Glasgow, which he resigned on account of advancing years.

Dr. William Thomson acquired the professorship of Practice of Physic in Glasgow, where he died at a comparatively early age. At the recommendation of Dr. John Thomson, his assistant, Dr. J. Y. Simpson, directed his great talents to the subject of midwifery, in which department he shone so conspicuously in Edinburgh that his great fame extended everywhere. And on the vacancy in this branch of medical education occurring in the University of Edinburgh, Dr. Thomson succeeded, with some little difficulty, however, in securing this chair for his assistant, pupil and friend. And we have all reason to deplore the comparatively early death of this very distinguished physician. I think, therefore, that Dr. John Thomson was fairly entitled to the designation of the Chairmaker conferred upon him by Dr. Knox.

The time at the disposal of the medical student for the acquisition of practical knowledge is very limited indeed, and when it is frittered away in such a variety of different branches it is quite impossible for him to acquire any solid and substantial knowledge of the real duties of his profession.

At the present moment Medical Education is calling loudly for Reform, and for this reason we have dwelt upon Dr. John Thomson and the Lecture system at some length. Neither medicine, nor surgery, nor any other practical art can ever be efficiently acquired by listening to lectures. I am glad to see that a writer in the *Medical Times and Gazette*, 19th July 1884, advocates exactly the same opinion which I have expressed here and elsewhere.

Dr. Alison is entitled to something more than a mere passing notice. He was hardly in his proper sphere as a professor of physiology, but he was the most popular professor in the University. I may say that the students almost worshipped him. The cause of this it would be most difficult to discover, for Dr. Alison was the

most unpretending, unassuming, and retiring of men. No doubt he was noted throughout Edinburgh for his unbounded liberality and benevolence. And the poor of Scotland will ever have cause to revere his memory as the great means of introducing the English poor law into Scotland. A variety of impracticable schemes had been proposed; but from the time of Dr. Alison no poor man in Scotland need starve to death. But none of these reasons seem to me to be sufficient to account for the great esteem in which Dr. Alison was held by the medical students.

Dr. David Boswell Reid also deserves a short notice on account of his improvements in ventilation. While the breath was nearly extinguished in other class-rooms by the cutting fumes of nitrous oxide, nitric acid, sulphuretted hydrogen, carbonic acid, and other noxious gases, no ungenial odour contaminated the atmosphere of Dr. David Boswell Reid's class-room. A flue opening upon the experimenting table, above which all experiments were performed, and communicating, we may presume, with a fire at some distance, conveyed all pungent odours and noxious vapours into the bowels of the earth. His class-room was always one of the curiosities which the stranger examined on his visit to Edinburgh. And the ventilation of the present House of Commons is a tribute paid to his abilities in this way.

II. RECOLLECTIONS OF SYME'S HOSPITAL VISITS.

Mr. Syme generally came to the Infirmary at about a quarter to twelve o'clock. As soon as he was seen coming down Infirmary Street—a view of which was obtained from the windows of his wards—the house surgeon went down to meet him at the door. After inquiring after the state of the patients, more particularly any operation cases which were in the wards, he went up to the little room next the reserved ward in the Old Infirmary—"Mr. Syme's room," as it was always called. It was soon filled by the dressers and visitors who happened to be present. After he had greeted all his young friends, and had for a short time entered into conversation, work was begun, and the patients from the waiting-room were brought in. What impressed itself upon all was the rapidity with which he made his diagnosis, even in the most intricate cases. One case, in regard to which more than one doctor was in doubt, after having watched it for weeks, was brought to the Infirmary by the patient's medical attendants, and arrived a few minutes before Mr. Syme's lecture hour. It was a case in which swelling and severe pain in the arm had caused much anxiety to the patient's attendants. Mr. Syme at once discovered the cause to be a small exostosis growing from the upper end of the humerus. He said it was a suitable case for his clinical lecture, and had the patient brought in as soon as the lecture was begun. After explaining the

case to his class, he removed the exostosis, so that within a quarter of an hour after coming to the Infirmary the cause of all the patient's suffering was successfully removed. Mr. Syme preferred to lecture on cases which he had never seen before. He used to say that in this way the students could see and watch the case from the beginning, and that he had an opportunity of illustrating the way in which a diagnosis should be arrived at. He was careful to teach that quickness in diagnosis only came from long and studious practice and not "by instinct," as some were apt to think, and he counselled his students not to think it necessary to arrive at a diagnosis the first time they saw a patient, but to wait until their doubts were cleared up. One of the maxims which he used to recommend as an excellent one in surgical practice was, "When in doubt, do nothing." This was his way of teaching, that when there was doubt as to an operation being necessary it ought not to be performed.

As a rule, only minor operations were performed on lecture days; but if a case—such as strangulated hernia—which the students had not often an opportunity of seeing, presented itself, Mr. Syme performed the necessary operation at lecture after having explained the case and the steps of the operation. His descriptions of the cases were given in as few words as possible, and were often illustrated by diagrams which he drew at the time. He used to lecture in the operating theatre of the Old Infirmary, and was often listened to by many of his former pupils and also by distinguished visitors, as well as by the members of his class at the time.

After lecture Mr. Syme did not see any other patient at the Infirmary under ordinary circumstances. If, however, he was anxious about any case in the wards he would sometimes call in the afternoon or in the early evening. Once, for instance, at the time when the question as to the efficacy of torsion as a means of stopping hæmorrhage had been brought before the profession, when acupressure was in its infancy, he trusted entirely to torsion to restrain the hæmorrhage in a case of amputation of the thigh. The amputation was Carden's and the artery was the popliteal. It was done at twelve o'clock—the usual operating hour—and the torsion was completely successful in permanently stopping the bleeding. About five o'clock in the afternoon Mr. Syme unexpectedly called to see how the case was going on. He found a dresser watching by the bedside of the patient, and the house surgeon, with two others, in the room not many yards from the ward, so that the patient would not have been much the worse if the experiment—if experiment it could be called—of twisting so large a vessel had failed. For many years after this case it was the custom in the clinical wards to apply torsion to arteries of considerable size; but Mr. Syme did not again twist so large a vessel. He said that he had only done it to prove how effectual torsion was to those who

thought that ligatures were undesirable. In his later years Mr. Syme did not go round the wards—he went to see any patient that the house surgeon asked him to visit—nor did he perform primary or other operations required at hours other than the regular visiting hour. These duties were performed by Mr. Joseph Bell, who was assistant-surgeon to the clinical wards.

Mr. Syme's relation to his students and dressers was of the most cordial kind, and his manner of addressing them was such as to inspire them with respect for him and to give them encouragement in their work. He was entirely opposed to the system of "Cram," which even in his day was too much in vogue. He said that it arose from each lecturer endeavouring to teach his students all he himself knew of his particular subject, instead of teaching them general principles which they could be expected to master thoroughly and to carry in their memories.

One of Mr. Syme's sayings was that the success of a doctor in after life was very much in proportion to the amount of time and attention that he had, as a student, devoted to the study of Anatomy and Clinical Surgery.

He was much displeased when he heard manual dexterity spoken of as the chief requisite in a surgeon; and he used to say that he had seen more manual dexterity exercised in a butcher's shop, in order to cut up the meat, than was ever required in the performance of a surgical operation.

He impressed upon his students that it would be their duty to give their earnest attention to every case committed to their charge as doctors, and he advised them to form the habit of taking clinical notes of their causes. He used to define the Principles of Surgery as the "Articles of Belief" on which the treatment of surgical cases was founded. He was a staunch friend through thick and thin.

CLINICAL RECORDS.

A CASE OF IDIOPATHIC DISLOCATION OF THE EYEBALL.

By DAVID M. GREIG, C.M., F.R.C.S.(Edin.),
Senior Surgeon, Dundee Royal Infirmary.

THE patient, a female child aged 11 months, had been under medical observation and treatment for malnutrition before she was referred to me on account of what appeared to be a congenital proptosis. The projection of the eyeballs, however, was found to be present only during fits of crying; but as the child was very irritable, and screamed incessantly while under examination or while undressed, it happened that she had not been seen at rest on any previous occasion when she had been brought to Dr. Fraser.

The parents were well. The father—a soldier—a somewhat dull and stupid man. The mother, if not particularly intelligent, was a clean-skinned healthy-looking woman, voluble and impulsive, and both she and her husband were addicted to occasional intemperance. A girl aged 5 and a boy aged 3, both well, completed the family, and there was none dead. The patient was born at term and appeared healthy, and showed no peculiarity of form or habit. She was breast-fed during the first two months of life, and thereafter put out to nurse that the mother might return to her work in the mills. The mother considered that the child's illness dated from then, for shortly after that the woman who looked after the child called the mother's attention to the fact that the child was not thriving. After having been a month at work the mother remained at home to attend to the baby, not, I am afraid, from any realisation of her maternal duties, but because strangers shirked the legal responsibilities attaching to a weakly boarded-out infant. During the subsequent eight months the child had been the subject of gastro-intestinal disturbance, characterised by some constipation, occasional diarrhoea, and much vomiting. The hygienic surroundings of the family were entirely unsatisfactory.

The suspiciousness which seems almost inborn in the minds of the degenerate class to which the parents belonged, the consciousness that investigation might disclose parental neglect, and the reluctance to lose sight of the insurance money militate against the acquisition of the accurate details of illness. The child, when I saw her, was small and emaciated, and had an unhealthy, starved appearance, and the dry and sallow skin lay in wrinkles on the body or hung loosely from the limbs. She weighed but 7 lbs. The hair was sparse and dry, and irregular in its distribution. From the left temple the hair was absent

—"from lying in bed" the mother explained, unaware of the hours of child-neglect of which this sign was evidence.

The child had a feeble whining cry, which never ceased except during feeding or sleep. The breathing was slightly noisy but did not suggest "snuffles." It was carried on through the mouth, which was kept slightly open. The tongue protruded a little, though it did not seem to be unduly large. The cranial vault was normal in size and contour, and though the sutures were very patent and the interfrontal suture quite easily made out, there was no sign of rickets and no appearance of hydrocephalus. The sclerotics were of that slightly blue tint so often found in children the subjects of any form of malnutrition. The eyeballs were not more projecting than usual, except when she cried, and she could easily close the eyelids over them. The palpebral aperture may have been a little wider on the left than on the right. The orbits, so far as could be made out, were normal in size and in depth. The tension of the eyeballs appeared normal and there was no strabismus. The pupils were normal and of equal size. The child was very fretty and cried much, and in crying the whole voluntary muscles were thrown into a state of convulsive movement. The eyeballs were protruded to such an extent that actual extrusion appeared imminent. The contraction of the orbicularis palpebrarum on each side was excessive, and the upper limit of these muscles, along with the corrugator supercilli, formed a fleshy torus across the forehead and a ring round each orbit. It was all slightly more marked in relation to the left eye. If the fit of crying was more violent than usual or with the slightest touch on the outer canthus the left eyeball would be projected with a slight jerk out between the lids. The eyeball could not be voluntarily retracted, but it was quite easy to push the globe backwards into position by a little gentle pressure.

In the unfrequent and short intervals when the child was at rest, though awake, the eyeballs were somewhat prominent, but during sleep there was no projection. Exaggerated protrusion only occurred during exacerbations of crying, and it was found impossible to obtain a photograph of the dislocation at that time. The accompanying photograph was therefore obtained during anæsthesia, and even then the rapid breathing of the emaciated body somewhat interfered with the definition of the child's features. To this extent the picture is fallacious and misleading, in that while the dislocation is present the features are placid and at rest, whereas had consciousness remained they would have been contorted in the extremity of convulsive crying.

The child improved much during the few days she remained in hospital—indeed it almost seemed as if this was the reason for her removal. At any rate, she was taken home by her parents against advice, and though she was alive two months later, she had rather lost than gained in strength and bodily condition.



Idiopathic Dislocation of the Eyeball.

Apart from subluxation of the eyeball following surgical operation on the bones of the face, or destruction of these bones from gunshot injury, true dislocation is a condition of very great rarity. Cases of traumatic dislocation¹ have been recorded, and are, of course, counterparts of surgical displacements, for there is more or less disorganisation of the bones of the orbits, and the eyeball is displaced through the fractured orbital plates of the bones composing that cavity. Naturally, dislocation into the antrum of Highmore is the commonest so produced.²

In contradistinction to traumatic dislocation of the eyeball are cases which may be called idiopathic. This term excludes traumatic displacements on the one hand, and symptomatic exophthalmos on the other. The condition might be tabulated thus: Dislocation of eyeball—

- A. Traumatic— (a) Surgical.
- (b) Accidental.
- B. Symptomatic—(a) Exophthalmic goitre.
- (b) Orbital tumour.
- C. Idiopathic— (a) Associated with permanent proptosis from shallow orbits, *e.g.* oxycephaly.
- (b) With normal orbits.

If proof were required of the rarity of any form of dislocation of the eyeball it is found in the fact that while traumatic dislocation is referred to only in the fullest of text-books on the eye,³ the possibility of idiopathic displacements is not referred to at all, except that variety in association with oxycephaly in which the orbits are peculiarly shallow. Yet even in oxycephaly, dislocation is extremely uncommon. In a series of cases of oxycephaly recorded by Fletcher,⁴ mention is made of a patient of Hutchinson's, a girl, aged 12 years, in whom "one of the eyeballs became dislocated on one occasion." Donaldson⁵ also has recorded a case of oxycephaly, a boy of 2½ years, in which "on about half a dozen occasions the right eye came well outside the eyelids, so that the child's father was obliged to push it back by gentle pressure with a soft handkerchief, at the same time throwing the head back." Such cases as these have for their primary causation the oxycephalic shallowness of the orbits. The absence of shallowness of the orbits puts my case in a different category, for in it the orbits were of normal size and depth. The eyeballs were not unduly large, and when the child was at rest were not proptosed. So far as I know my case is a unique one, and I do not know of the existence of any photograph showing the eye in dislocation.

My case and others referred to, refute the statement in Holmes' *System of Surgery*⁶ "that without rupture of the optic nerve the eye cannot be thrust upon the cheek"; but there, too, the writer seems ignorant of the possibility of displacement other than traumatic.

It is possible that in my patient the extreme contraction of the orbicularis palpebrarum may have caused some retraction of the lids in the excess of the spasm of crying, but the thrusting forward of the eyeball was certainly the main factor in the production of the dislocation. The protrusion must have been caused from within the orbit, and is the more unexpected as the child's emaciation would not tend to make the orbit any shallower by accumulation of fat. It is generally believed that the proptosis of exophthalmic bronchocele is due to contraction of Müller's muscle within the orbit, by stimulation of the sympathetic by a hormonin autacoid, and this effect of stimulation is borne out by experiments on animals.⁷ It may be that in such a very rare case as mine, Müller's muscle may have undergone abnormal development either congenitally or from frequent stimulation, for we must agree with Cunningham⁸ that in normal conditions it can only have "a slight influence in the protrusion of the eyeball."

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RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

W. T. RITCHIE, M.D., EDWIN MATTHEW, M.D., J. D. COMRIE, M.D.,
AND A. GOODALL, M.D.

SPLENECTOMY IN PERNICIOUS ANÆMIA.

THE benefit or otherwise of this procedure is dealt with in three papers (*Journ. Amer. Med. Assoc.*, 2nd and 9th September 1916) by Lee, Minot, and Vincent; Krumbhaar, and M'Clure.

Lee, Minot, and Vincent studied 15 cases before and after splenectomy. Clinically the results were as follows:—One patient died the day following operation. In another the operation was too recent to afford any data. Another, 2½ months after the operation, still remains in hospital for thrombosis. The other 12 left hospital, feeling better, looking better and less yellow. An examination of the blood still gave a pernicious anæmia picture. As regards the number of red cells, 8 showed a marked increase up to 4,000,000, and still a diagnosis could be made from the blood-films. In 10 of the patients 6 months had elapsed since splenectomy. Five of them had then a relapse. Altogether, only 1 went a year without a relapse; and this case, too, relapsed and died 16 months after operation. They are of the opinion that the end results do not show any permanent good from splenectomy. To ascertain what changes, if any, followed splenectomy they studied the formed blood-elements from the bone-marrow, as likely to indicate any true signs of blood regeneration.

Leucocytes.—A leucocytosis—10,000 to 35,000 within 24 hours after operation—which subsided in a few days. On the whole the tendency after splenectomy is for a distinct increase of the leucocytes, when compared with pernicious anæmia before operation, together with a normal Arneth picture, the usual in pernicious anæmia being a right-handed shift. The higher the leucocytosis the greater the improvement after splenectomy.

Platelets.—Usually low in pernicious anæmia. After splenectomy a marked increase, with a tendency to presence of large platelets.

Howell-Jolly Bodies in Red Cells.—Very few in pernicious anæmia, but occur constantly in every case after operation. Their presence indicates increased bone-marrow activity.

Red Cells.—Marked increase of reticulated red cells up to 20 per cent., normally about 0·8 per cent. This again indicates increased

activity in part of marrow-producing red cells. The presence of these cells gives the best data for estimating the activity of the bone-marrow in producing red cells. These observers conclude that by splenectomy, just as may occur spontaneously or after transfusion, one gets a stimulation of the bone-marrow, and also that the stimulation is the greatest of any known therapeutic measure. Splenectomy acts on the whole bone-marrow. Krumbhaar in his paper has collected, as far as possible, all the published cases and analysed the results.

He finds—1. Of 153 patients studied, 19·6 per cent. died within 6 weeks; 64·7 per cent. were improved generally, and showed improved blood-picture; 15·7 per cent. showed no improvement.

2. Of cases showing improvement shortly after operation a large number failed to maintain the improvement, or have since died in a relapse or from intercurrent disease.

3. In no case can a cure be said to have been effected, even in the few in good condition 2 years after operation, for the blood-picture in these individuals still shows many of the characteristics of pernicious anemia.

4. On account of the improvement following splenectomy it is a justifiable and advisable procedure.

5. The best results are obtained by one or two transfusions preceding splenectomy.

6. The best results are obtained in those who have not passed the fifth decade, and who have not had the disease for over a year. Those with enlarged spleens do better than do those without.

M'Clure in his paper also gives his results after splenectomy, but is of the opinion that more benefit will be got if, in addition, repeated systematic transfusion be practised. He recommends that, if there is not a rapid improvement after splenectomy, transfusion should be continued until the hæmoglobin reaches 90 per cent., and that the hæmoglobin should not be allowed to fall below 75 per cent.

THE EPIDEMIOLOGY OF LOBAR PNEUMONIA.

Stillman (*Journ. Exper. Med.*, December 1916) contributes a valuable paper on the "Epidemiology of Lobar Pneumonia," to ascertain the factors concerned in the transmission of pneumonia from one individual to another.

In his paper he discusses various points which help to elucidate these factors, the varieties of pneumococci concerned in the production of lobar pneumonia, the varieties of pneumococci in the normal mouth, the incidence of carrier condition in healthy individuals in contact with patients suffering from lobar pneumonia, and the persistence during convalescence of the type of pneumococcus causing the disease. It is now known that varieties of pneumococci result in pneumonia; and he has studied the types isolated in 313 cases occurring in 4 years in the

hospital of the Rockefeller Institute. Four types of pneumococcus cause pneumonia—called Types I., II., III., IV.—which were found respectively in 33, 31, 11, and 23 per cent. of the 313 cases. Types I. and II. are not found in the normal mouth, except in the case of carriers, and are therefore strictly disease-producing organisms, and infection with these types occurs only as the result of direct or indirect contact with a previous case of pneumonia. Pneumococci of Type III. (*pneumococcus mucosus*) are common in the mouth flora of healthy individuals, and here, when pneumonia occurs, the condition may be autogenic in nature. The commonest type found in the mouth is Type IV., which caused pneumonia in only a few instances. Stillman, as a result of his observations, reaches the following conclusions:—

1. Pneumococci of Type I. and Type II. are responsible for the majority of the cases of lobar pneumonia.
2. Among the pneumococci found in the mouths of healthy individuals Type IV. predominates, Type III. is fairly frequent, and atypical organisms of Type II. are occasionally encountered. Organisms of these types give rise to a minority of cases of lobar pneumonia.
3. Healthy persons intimately associated with cases of lobar pneumonia may harbour in their mouth secretions the highly parasitic pneumococci of Types I. and II.
4. Occasionally a carrier of Type I. or Type II. pneumococcus is encountered, in whom it is impossible to trace any contact with an infected patient.
5. Convalescents from lobar pneumonia may carry for a considerable period of time the type of pneumococcus with which they were infected.

MASSIVE HÆMORRHAGES FROM THE STOMACH WITHOUT DEMONSTRABLE ULCER (A. V. Moschcowitz, *Amer. Journ. Med. Sci.*, November 1916).

This paper is the result of 4 cases operated on by the author for gastric ulcer following severe hæmorrhage, and in none of the cases was a gastric ulcer found. The 4 cases are, first of all, fully described. The author then attempts from his cases and others in literature to decide their etiology and pathology.

The gastric mucosa has its mucous membrane involved in various ways—(1) The “mucous erosions”; (2) the “exulceratio simplex” of Dieulafoy, often called Dieulafoy’s ulceration; (3) true gastric ulcers. The author’s cases do not, he considers, fall into group 1, the very fact of the severe hæmatemesis excluding this. Operative procedure in the 4 cases decided they did not fall into group 3—true gastric ulcers. He is confident that his cases correspond to Dieulafoy’s ulceration. This condition of exulceratio simplex has only one marked symptom, viz. profuse hæmatemesis. So far as stomach symptoms are concerned

the previous clinical history is negative. The general health, too, is usually quite good, and suddenly, without any warning, a profuse hæmorrhage occurs, so profuse in some cases as to be fatal. The gastric contents show nothing abnormal, and the subsequent history of a case is that of a severe secondary anæmia. The condition occurs most frequently in females. Pathologically the condition is an erosion over a small artery, through the entire thickness of the mucous membrane, which also involves the submucous coat. There is no induration or infiltration, as in true gastric ulcer, and the erosion heals without any cicatrisation.

THE DEFINITE TREATMENT OF PNEUMONIA.

Cohen (*Canadian Journ. of Med. and Surg.*, November 1916) details his 12 years' experience with quinine in the treatment of pneumonia. He calls it the definite treatment of pneumonia, to distinguish it "from the vagueness of expectancy on the one hand, and the exactitude of specific treatment on the other." He has come to the conclusion that it is of very great use, not necessarily alone, but along with other necessary treatment. By it he considers he has greatly reduced the mortality among alcoholics and derelicts. By it toxæmia is minimised, cough does not trouble, sleeplessness and delirium are less frequent, and hypnotics and sedatives are less frequently necessary.

The quinine should be given promptly and in massive and repeated doses. He recommends for an adult 15 to 25 grs. every 3 hours. The temperature curve can be taken as an index of quantity and frequency. If it tends to remain below 102·5° F. stop the quinine, and resume if it rises above 103° F. Only one dose of quinine may be required, or it may be necessary to continue it for 2 or 3 days. Four or five doses is a fair average. The most effective preparation Cohen has found to be quinine and urea hydrochloride, given by intramuscular injection in 25 to 50 per cent. sterile solution. Another useful preparation is methyl-hydro-cuperin hydrochloride. According to his researches all cinchona derivatives have a distinct germicidal influence upon the three distinctive types of pneumococci.

E. M.

SURGERY.

UNDER THE CHARGE OF

J. W. STRUTHERS, F.R.C.S., D. P. D. WILKIE, F.R.C.S.,
AND JAMES M. GRAHAM, F.R.C.S.

CARREL'S METHOD OF TREATING INFECTED WOUNDS.

THE value of eusol and other preparations of hypochlorous acid is now generally recognised in the treatment of infected wounds. Excellent

results have been recorded with the former both by continuous and intermittent application of the antiseptic to the wound surfaces.

Desfosses (*La Presse Méd.*, 30th November 1916) describes the details of the technique employed by Carrel.

The first step in the technique in cases of badly infected wounds is to open up freely the wound and all its recesses, to extract foreign bodies, and to excise necrosed or putrefying soft parts. After mechanical cleansing of the wound the object of the method is to sterilise the wound surfaces by the more or less continuous application of a suitable antiseptic, which is brought into intimate contact with all the raw surfaces. Solutions of hypochlorous acid or of hypochlorites, such as Dakin's solution, can render an infected wound aseptic, destroying the organisms without injury to the cells of the tissues. The success of the treatment depends on the effective and harmless antiseptic action of the preparations of hypochlorous acid or of the hypochlorites, when applied continuously to infected surfaces. Formerly, surgeons employed antiseptics which were either too strong or too weak to be effective, and the duration of their application has been too short to destroy the organisms. Lavage of the wound is therefore the essential feature of Carrel's method. The effect of the treatment can be judged by the clinical features of the case and by bacteriological examination of the secretions from the wound.

The lavage of the wound may be continuous or intermittent, the hypochlorite solution being brought in contact with all the surfaces and corners of the wound by means of fine perforated rubber tubes. As the amount of fluid used is small no special arrangements are necessary to collect the fluid, which is absorbed by the dressings or evaporates. Intermittent lavage is more commonly employed than continuous irrigation by means of the drop method.

Red rubber tubes, with an interior diameter of 4 mm. and with walls of 1 mm. in thickness, should be employed; it is necessary for the tubes to be flexible and sufficiently resistant to avoid occlusion by pressure of the soft parts. The length of the tubes varies from 15 to 40 cm. Some are closed at one end of a ligature, and are perforated with numerous small openings for a distance of 5 to 15 cm. from the closed end. Eight small holes should be allowed for every 5 cm. of the tube, and these should be $\frac{1}{2}$ mm. in diameter. The simplest way to perforate the tubes is by means of a punch of 2 mm. diameter. Other tubes are kept open at both ends, the central part only being provided with holes, and the fluid enters the tube at either extremity. In some cases it is advisable to have the perforated tubes surrounded by a layer of absorbent gauze. While the perforated tubes are kept in uniform lengths a tube can be lengthened, when desired, by joining to an additional piece of rubber tubing of the same calibre by means of a glass connection, which is 25 mm. in length and 4 mm. in diameter.

The wound is irrigated by means of a glass reservoir suspended above the bed and connected with the perforated tubes within the wound by a rubber tube and intervening glass cannula. Several varieties of cannulae are required, according to the number of tubes employed in irrigating the wound. The reservoir should have a capacity of 1 litre, and should be fixed at a height of 1 metre above the level of the bed. The dependent outlet should have a diameter of 7 mm., and to this is attached a rubber tube of 7 mm. diameter and $1\frac{1}{2}$ or 2 metres in length. The latter tube is connected by means of a glass cannula to the perforated tubes in contact with the wound surfaces. When only one perforated tube is necessary the connecting cannula should be conical, 2 to 3 cm. in length, the interior diameter of the ends being 7 mm. and 3 to 4 mm. respectively. When two tubes for lavage are needed, or if irrigation through both ends of a single perforated tube is desired, the cannula should be Y-shaped. In the case of large wounds three to six perforated tubes may have to be provided for, and special glass cannulae are needed; for example, in a case requiring four tubes the cannula should be 6 to 7 cm. in length and the lumen 7 mm. in diameter; the distal end of the cannula is closed; from one side of the cannula four branch connections project at right angles, so that the cannula has the appearance of a comb; the lateral connections should be 2 cm. long, and have a diameter of 3 to 4 mm., so that they can be fitted to the perforated tubes. A small metal clip is applied to the rubber tube which descends from the reservoir; the flow of antiseptic can thus be interrupted or liberated as required.

As it is important to bring the antiseptic in intimate contact with the wound, the perforated tubes must be carefully arranged on the wound surface without any intervening dressings.

When the wound is situated on the anterior aspect of the body, and practically horizontal, the arrangement of the tubes is comparatively easy. If the wound is inclined the tube should be placed along the upper border so that the solution will flow over its surface by the action of gravity. One or more perforated tubes with the ends closed may be used, or, as mentioned above, a single tube with perforations in the middle portion may be employed in the form of a ring by attaching the ends to a Y-shaped cannula. The latter arrangement is useful in cases of septic stump after amputation; the shape of the loop thus formed may be modified, according to the shape of the wound, by tying together the limbs of the loop with a thread. The tubes should be kept fixed in position by a strip of plaster at the edge of the wound, and by gauze swabs soaked in Dakin's solution applied on the top of the tubes over the surface of the wound.

In the case of perforated wounds with two openings the antiseptic is readily brought into contact if the axis of the wound is horizontal, but if the line of the wound is more or less vertical it is advisable to

cover the tube with a layer of gauze, otherwise the antiseptic will escape too rapidly from the lower opening and the wound will not be sufficiently bathed.

When a wound presents a single orifice the method to be adopted will depend on the position of the opening. If this is above, a tube with a single comparatively large opening near its end is inserted to the depths of the wound; the cavity of the wound will then be easily filled with the antiseptic and a rapid sterilisation is favoured, provided that there is room for the fluid to escape when a fresh irrigation is made. If the orifice is dependent it is necessary either to surround a perforated tube with gauze, in order to maintain contact, or to employ simple perforated tubes and to inject the fluid under increased pressure. The facility with which the fluid drains off in cases like the above militates against a rapid improvement, such as can be expected when stagnation is more readily obtained. When the orifice is on the lateral aspect of the body a certain amount of stagnation can be achieved by the pressure of gauze swabs placed over the opening of the wound, and by altering the position of the patient.

Similarly, in the case of large wounds with several orifices, the solution tends to escape too rapidly by the lowest-placed openings. Tubes perforated for 10 or 15 cm. should be introduced into all the recesses of the wound and as deeply as possible. In order to keep the tubes pressed against the soft parts gauze compresses should be placed in the centre of the wound.

After arranging the tubes in the desired position gauze swabs soaked in Dakin's solution should be placed on the surface of the wound. These help to maintain the position of the tubes. It is necessary to ensure that the perforated parts of the tubes are within the limits of the wound, as otherwise the antiseptic solution would escape over the skin and be wasted and possibly harmful. The non-perforated parts of the tubes should extend for at least 15 cm. beyond the wound.

The skin surrounding the wound can be effectively protected from irritation by the hypochlorite solution by application of lint sterilised in vaseline. This is specially valuable in protecting the skin of the back and the posterior surfaces of the limbs.

The dressing recommended by Carrel is partly composed of absorbent, and partly of non-absorbent, cotton-wool arranged in two layers and covered on the surfaces by layers of gauze. The dressing is applied so that gauze and a layer of absorbent wool is next the wound surface. The non-absorbent gauze prevents the solution from escaping on the surface but does not prevent evaporation. No oiled silk or waterproof tissue is used.

The dressing is wrapped round the limb and fixed with safety-pins, no bandage being necessary; the wound can readily be exposed without disturbing the patient. Special openings can be made in the dressings

so that the tubes can conveniently enter the wound, and when several tubes are required they can be connected to the reservoir by means of a branched cannula, as already described. The dressings should be renewed every twenty-four hours, but if there is much soakage the outer coverings can be shifted without disturbing the position of the tubes at any time. The mattress should be protected by a waterproof sheet; but this is only a precautionary measure, as the irrigation should never be so free as to damp the bed.

Intermittent irrigation of the wound is to be preferred in most cases to continuous, because, where there are several openings in a large wound, the fluid is apt to run out if the flow is continuous.

The routine method is to irrigate the wound once every two hours. This can be done in a large number of cases with little trouble by the nurse, who has simply to release the clip on the outflow tube for a few seconds. The pressure within the tubes causes the fluid to escape in jets from the perforations. The quantity thus injected varies from 20 to 100 c.c., and when properly done there should be no inundation of the patient or of the bed. The amount of fluid required for a single case in the twenty-four hours will vary from 250 to 1200 c.c., according to the extent of the wound.

After the wound has become aseptic it can be closed by suture or by adhesive plaster. Before deciding on closure the number of organisms must have steadily diminished, and for three consecutive days should have disappeared from the discharge. Secondary suture can usually be performed from the eighth to the eleventh day.

MURPHY'S OPERATION FOR ANKYLOSIS OF THE TEMPORO-MANDIBULAR JOINT.

Murphy has performed the operation of arthroplasty for ankylosis of the jaw successfully in a series of twenty-three cases. Kreuscher (*Interstate Med. Journ.*, October 1916) describes the details of the operation as practised by Murphy.

The joint is exposed by a vertical incision in front of the ear, extending from $1\frac{1}{2}$ in. above the zygoma in the hair line downwards to the lower border of the zygoma. The incision then curves forwards on the upper margin of the zygoma for $\frac{3}{4}$ of an in., and finally turns upwards slightly so as to avoid injury to the temporal and orbicular branches of the facial nerve.

The subsequent scar is slight, being mostly concealed by the hair. Great care is necessary in dividing the bone, as the internal maxillary artery lies immediately beneath the neck, and the brain is only separated from the condyle by a thin shell of bone.

After the incision has been made the edges of the wound are drawn downwards so that its lower lip is displaced below the zygoma; this

gives a good exposure of the joint. The neck of the mandible is then laid bare on all its surfaces by detaching the periosteum with a curved periosteotome. To avoid injury of the internal maxillary artery two curved periosteotomes should be pushed in behind the neck of the bone, so that the posterior aspect of the neck is completely encircled before being divided.

A section of bone $\frac{1}{2}$ in. wide, together with the periosteum, should be removed by means of a chisel, burr, or Gigli saw. Murphy preferred the chisel, as the angulation necessary in employing the Gigli saw is apt to cause the wire to snap.

As soon as the bone is divided the mouth can be opened readily. A flap of fat and fascia should now be prepared from over the temporal muscle, and, if necessary, the vertical part of the incision can be extended upwards for 1 or 2 ins. The flap should be 1 in. wide and 2 ins. long, with its base at the zygoma. After being freed the flap is folded downwards and packed into the gap left by removal of the bone, where it is retained by a few catgut sutures at its anterior and posterior basal angles. The skin wound is closed with horsehair, dusted with bismuth subiodide, and sealed with collodion. A wedge-shaped wooden block is inserted into the mouth on the affected side between the molar teeth in order to keep the jaws open and to prevent pressure on the interposed flap, and this should be retained for a fortnight, after which the patient is encouraged to masticate. The wound should be examined carefully every day to detect any signs of a hæmatoma, which, if left, would interfere with the nourishment of the flap. If there is a tendency for blood to collect it should be withdrawn with a hypodermic needle.

The results of the operation have been uniformly successful, and the operation was considered by Murphy as one of the most gratifying in bone and joint surgery.

The risk of injury to the internal maxillary artery is not great if the precautions mentioned are taken; but in one case in which this accident happened it was found necessary to ligate the external carotid artery at the cornu of the hyoid. The branches of the facial nerve must be preserved; and, finally, Murphy emphasises the importance of removing a portion of the neck of the bone in preference to the division of the ankylosis at the line of the articulation, as the base of the skull is almost certain to be penetrated if the latter procedure is attempted.

J. M. G.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

W. B. DRUMMOND, M.D., AND A. DINGWALL FORDYCE, M.D.

MENTALLY DEFECTIVE CHILDREN.

W. A. POTTS contributes a paper on the "Moral Defective" to the Conference on Special Schools Work, Manchester, October 1916. In his opinion the moral sense is centred in areas and tracts of the brain which we shall one day be able to locate. A true moral defective, however, is rare. Out of one hundred consecutive admissions to a Magdalen Home Potts found that thirty-seven were defective in some way; seven of the thirty-seven he classes as moral imbeciles. These seven morally defective girls, though sharp and intelligent, had no sense of honour or modesty, and were insusceptible to moral and religious training, thereby differing markedly from the majority. Nothing could restrain them from lying and stealing from their companions. These figures show that there was one moral defective for every five mental defectives, and on this basis Potts concludes that there is one moral defective in every thousand of the population, upon the basis that five in every thousand are mentally defective. He does not, however, give any justification for his applying to the ordinary population figures obtained at a Magdalen Institution. With regard to the number of moral defectives who should be placed in a Special Institution, Potts recently estimated that Birmingham requires twenty-two places in the first instance for cases of a dangerous and violent nature; that is to say, one place for every fifty thousand of the population. Many moral defectives can be treated with ordinary defectives, but some ought to be segregated in a special State Institution.

In discussing diagnosis, attention is drawn to the recent work of Goddard, who at three trials, in each of which a defective was convicted of murder, first tested the prisoner by the Binet scale, and then gave evidence that, as he was mentally under the age of twelve, he did not know the nature and quality of his act. Of these three murderers two were admitted by the jury to be defective. The other, however, was convicted of murder and electrocuted.

How can the presence or absence of moral sense be recognised? "Partly by the previous history of the individual, and partly by his conduct immediately before and after his crime. There may be no premeditation, no adequate motive, no attempt at concealment. In addition, his demeanour and attitude during the trial or investigation is an important clue. A trained observer will see that there is no sense of shame, and no regret whatever for his act. A method of great value is to get an impressive speaker to preach to the delinquent,

while the expert observes how he receives the homily; the speaker should do as he would with a person of normal intelligence, and it is much better that he should not know that the criminal is believed to be a defective. I have had many opportunities of seeing youths in prison being addressed in this way. While the kindly words of advice and reproof affect the normal, to whose eyes they will frequently bring tears, they have a far different effect on the moral defective. The more earnestly the speaker dwells on the dreadful nature of the offence, the more bland and innocent will be the smile on the face of the delinquent, who shows that he has no appreciation whatever of the real nature of his act. When pressed for an explanation, instead of blaming bad companions, or making the usual excuses, he will probably say he did it for the fun of the thing. From first to last his attitude and demeanour will be that of callous indifference, and markedly different to that of a normal person."

After discussing briefly the views of Lombroso, Havelock Ellis, and Goring on the physiognomy of the criminal, Potts falls back on the conclusion that the chief aid to diagnosis is to be found in the previous history of the individual. "The treatment of the moral imbecile presents great difficulty; prison does him no good, and he may be too intelligent or too wicked for an institution for ordinary defectives. Nothing but prolonged treatment is any use. During all the time he must be under firm discipline, with plenty of occupation; a simple, active, outdoor life; no stimulants of any kind. A careful investigation must be made for any abnormality. Wonderful moral reformations have sometimes followed an operation for adenoids, or suitable glasses to relieve an abnormal strain on the eye."

SPLENECTOMY.

Cholmeley, in the *British Journal of Children's Diseases* (November 1916), describes two cases. The first case presented the typical appearance of the lemon-yellow tint, with slight icteric tinge of the conjunctivæ. These symptoms, which always suggest pernicious anæmia in the adult, should always suggest Banti's disease in a child, and the first thing to do is to feel for the spleen, and the next to make a blood-count. Leukæmia does not show in children this lemon tint in the early stages. The appearance is more like that of the "large white face" as seen in "large white kidney."

The second case did not show this lemon tint. The history given was very dogmatic. The relatives stated that immediately after the bombs were dropped by a Zeppelin close to his house he became ill and his abdomen began to enlarge, this enlargement being due to the growing spleen. Although he was familiarly called the "Zeppelin spleen" case, the shock-causation theory should be received with caution, unless it should be substantiated by other well-marked cases.

A former case of Banti's disease was first treated with X-rays and arsenic without any definite benefit. He was then transferred for splenectomy, and after this he made apparently a complete recovery. This failure with X-rays is in striking contrast to the markedly beneficial influence of X-rays in lymphadenoma and leukæmia; and future cases of Banti's disease will never be treated with X-rays, but transferred at once for splenectomy, which acts like a charm. The huge blood-destroying organ is removed and excessive hæmatolysis stops at once.

RICKETS.

Pritchard discusses "The Treatment of Rickets, based on a New Theory as to the Pathogenesis, with an Illustrative Case" (*Brit. Journ. of Child. Dis.*, October 1916). His view is that rickets is not a deficiency disease, but is in all cases the result of "a relative excess of food which has called into play certain protective mechanisms, which have brought about a short-circuiting of the oxidation processes and the production of an acidosis." If children are kept in hot stuffy rooms, if they are wrapped up in a multiplicity of clothes, if they are seldom taken out of doors, and if they are given no opportunities for muscular exercise, they will create no demand for food, and consequently any dietary, however small, may be relatively excessive, and, if excessive, must be disposed of by one of the protective methods." These are the usual conditions which surround the victims of rickets. Under such circumstances we could predict with complete confidence that the child would, if he could, lay up stores of glycogen and fat and become obese; that he would show evidence, first of excessive combustion by sweating and vascular dilatation of the superficial capillaries of the face and other exposed parts, and possibly by disturbances of the heat-regulating centres, and then of suboxidation with the symptoms of an acidosis, with enlarged epiphyses and demineralisation of bone; and, finally, of acyanotic hyperpnœa, with other serious nervous manifestations." Treatment in accordance with these assumptions is found to give highly satisfactory results. The acidosis is treated by the exhibition of large doses of alkalies, but the alkali tolerance has been very high, and the urine has rarely been alkaline in spite of the alkali administration. The presence of the Gram-negative mobile bacilli in the urine may be explained by its acid reaction.

To compensate for the anaemia carbonate of iron has been given, and phosphorated cod-liver oil (1 in 10,000) has been supplied with the view of building up the damaged nervous system. The diet has been simply of milk, restricted in quantity.

At the same time a demand for food is created by massage, resistance exercises, cold douches, and, as far as circumstances allow, by open-air treatment.

POLIOMYELITIS.

Frost publishes in *Pediatrics* (September 1916) a revised summary of a paper originally published in the *Hygiene Laboratory Bulletin*, No. 90, on our present knowledge concerning the cause and transmission of poliomyelitis.

The specific cause of poliomyelitis is a minute micro-organism—a so-called virus—capable of cultivation *in vitro* on suitable media.

The virus derived from human cases is pathogenic for apes, producing in them characteristic effects essentially similar to those produced in man. As is the case with many other pathogenic organisms, considerable variations in virulence are noted. As to the evidence and vehicles of infection, the theory that the disease is transmitted by a biting fly—*Stomoxys calcitrans*—is discussed, but Frost considers that, on the whole, the experimental evidence points to the conclusion that poliomyelitis is a contagious disease, spread from person to person through interchange of infectious secretions, the sources of infection being the clinically definite and clinically indefinite acute cases of poliomyelitis, convalescents, and passive human carriers.

The general epidemiological characteristics of the disease are discussed under the following headings:—Geographic distribution; seasonal prevalence; sporadic and epidemic occurrences; general characteristics of epidemics—(a) irregular geographic distribution of epidemic foci; (b) rapid spread over wide areas; (c) small total incidence in the population affected; (d) incidence in rural and urban communities; (e) distribution among the various elements of the population in epidemic foci; (f) local sources and roads of infection; (g) evidence of transmission by insects.

Two facts which entirely fail to be explained by the theory of insect transmission *per se* are the small total incidence of poliomyelitis, and more especially its preponderating incidence in children.

Diseases known to be insect borne are not characteristically more prevalent in children than in adults, nor is there any obvious reason why they should be, unless children are more susceptible to the infection. The hypothesis of insect transmission, therefore, like that of transmission by direct contagion, leads back to the assumption of general immunity to the infection on the part of adults and to unrecognised sources of infection.

On the whole, while there is much to suggest that poliomyelitis is insect borne, its epidemiology appears to be equally well explained on the theory of direct transmissibility through infectious secretions, and the latter theory is at present supported by more experimental evidence than is the theory of insect transmission. W. B. D.

DERMATOLOGY.

UNDER THE CHARGE OF

R. CRANSTON LOW, M.B., F.R.C.P., AND F. GARDINER, M.D., F.R.C.S.

THE EXUDATIVE DIATHESIS.

EVERY practitioner must have been struck by the frequency with which inflammatory skin affections occur in members of the same family. The type of individual who is especially liable to these conditions was described in 1905 by Czerny as belonging to the exudative diathesis. In the *American Journal of Cutaneous Diseases* (1916, pp. 739 and 804) Engman and Weiss describe the condition in detail. The first thing noticed in infants of the exudative diathesis is that the child is slow to regain its birth-weight after the physiological loss. The birth-weight is not regained till the third or fourth week. There are no marked gastro-intestinal symptoms. Geographical tongue is very frequent, and diarrhoea may occur with mucus in the stools. The respiratory tract shows important symptoms. The nasal, pharyngeal, and laryngeal mucous membranes show simple hypertrophy. Adenoids and hypertrophied tonsils are common. These children are also liable to the so-called asthma and bronchitis. These are said to be secondary to irritation from dust, etc. Glandular enlargement occurs in these children, but is secondary to infections in the respiratory tract or of the skin. The combination of respiratory and skin affections should always lead the practitioner to suspect the exudative diathesis. Seborrhœa capitis is common, either remaining as such or going on to the familiar infantile "eczema." Intertrigo occurs very readily in any of the folds of the body or limbs. Prurigo is also not uncommon, often beginning in the early months of life, and unless steps are taken to treat the condition the itching leads to loss of sleep, and so the child does not thrive. Dermatitis and furunculosis may also result from the scratching. Rachmilewitsch describes a skin reaction which, he says, is peculiar to these children, and by means of which the exudative diathesis can be diagnosed. He scarified the skin, and applied a paste of Colman's mustard and water. Half an hour after the application a prominent wheal appeared and serum exuded from the scarification. After about two hours the serum dried up and formed a small yellow crust. The wheal usually disappeared on the second day or so, but it sometimes persisted as long as eighteen days. Rachmilewitsch says that this reaction occurs in all exudative children, whether they show few or many symptoms. Normal children show only the erythema which mustard always produces. This reaction occurred in new-born children, thus supporting Czerny's theory that the diathesis is a congenital one. The blood in such cases shows an

eosinophilia. This sign is not quite reliable, but is very frequent, especially where the skin is affected, and tends to disappear as the skin affection recedes.

The treatment is dietetic. Up to the eighteenth month the infant should be given the smallest possible quantity of milk on which it will thrive without getting fat. For part of the milk, carbohydrates, soups, and vegetable extracts may have to be substituted. The condition is always unfavourably influenced by over-feeding. After the second year a vegetable diet should be given, supplemented by small quantities of milk and meat. Unlimited water may be given. Eggs, cream, butter, sweets, and cooked fruits are contra-indicated. By that method of feeding most of the symptoms will disappear; but, in addition, if the skin is affected, appropriate local treatment must be applied.

The opinion of those who have worked on the subject is that the exudative diathesis is a disturbance of metabolism, some considering it a disturbance of fat metabolism, others of salt metabolism. Engman and Weiss examined the blood in such cases to see whether the acetone bodies were increased, and, so far as can be seen, no increase occurs. This would seem to show that fat metabolism is not at fault. A salt-low diet undoubtedly caused improvement in some cases, but it is difficult to draw absolute conclusions, as the cases were treated in hospital, and the general hygienic conditions might have had an influence in producing the results. The authors are inclined not to regard the condition as a fault of metabolism, but rather as a congenital irritability, and therefore increased permeability of the capillaries of the skin and mucous membranes. Local irritants, such as are met with in ordinary life, cause an increased transudation through the permeable vessel walls, and so give rise to inflammatory affections of the skin and mucous surfaces.

NÆVUS ANÆMICUS.

Nævus anæmicus is not a common condition, and is only of importance because it may be confused with other conditions. It is usually discovered accidentally when the patient is being examined for something else. The spots are occasionally single, but are usually found in groups. In the case described by Lane (*Amer. Journ. Cutan. Dis.*, 1916, p. 602) there were six white spots on the right cheek. The spots in such cases appear anæmic, but otherwise are indistinguishable from normal skin. They are generally rounded, and their borders somewhat irregular and sharply outlined. The surrounding skin may be normal or show slight teleangiectases at the edges. Friction or the application of heat or cold makes the spots more conspicuous. The condition is congenital, and there is never any history of accident or antecedent disease. The histology is not very definite. Vörner considers it due to the inability of the capillaries in certain areas to dilate.

Stein found the actual number of vessels diminished. The condition may be confused with partial albinismus, but differs, in that there is no diminution of the pigment in the skin. In leucoderma there is also loss of pigment, and "white spot disease" cannot be confused with it as that condition is not congenital.

DIFFERENTIAL BLOOD-COUNTS IN PARASITIC SKIN DISEASES.

Strickler (*Amer. Journ. Cutan. Dis.*, 1916, p. 757) examined the blood in 60 cases of tinea tonsurans, 14 cases of pediculosis corporis, and 4 cases of favus. From a study of these cases he found that in ringworm of the scalp there is an increase in the blood of the small lymphocytes. The average count was 37.4 per cent. of lymphocytes. In 80 per cent. of the cases this increase of lymphocytes was present. He also found a slightly greater increase of lymphocytes in those patients who were treated with vaccines than in those receiving local treatment only. He considers that this increase in the small lymphocytes may be of some value in the differential diagnosis between ringworm of the scalp and other affections. In the 4 cases of favus which were examined a small increase of lymphocytes was found, but the cases are too few from which to draw conclusions. Strickler also found that in pediculosis corporis there is no change in the blood-picture from the average normal case, whereas in scabies over 80 per cent. of the cases show 5 per cent. or more eosinophiles.

LICHEN PLANUS ACCOMPANIED BY BLEB FORMATION.

Although lichen planus is typically a papular disease, it should be remembered that vesicle and bleb formation may also occur. This is not to be wondered at, because, microscopically, the lesion, which is clinically a papule, often shows the early stages of vesicle formation. Montgomery (*Journ. Cutan. Dis.*, 1916, p. 747) reports two such cases, in one of which, in addition to a typical eruption of lichen planus on body, limbs, and inside the mouth blebs occurred, and in the other vesicular lesions. In the case with bleb formation these seemed to arise where papules had not previously existed. They caused very little itching. In the case with vesicular lesions the spots began as small red spots on which small vesicles developed. The itching here was considerable, and was relieved on opening the vesicles. In both these cases referred to no arsenic had been taken, but in cases of lichen, where arsenic is being taken and bullæ develop, the arsenic should be stopped in case it is the cause of the bullous lesions. Cases of lichen with bullous formation may be mistaken for pemphigus, especially when there are lesions inside the mouth. The presence of typical lichen papules on some part of the skin will usually prevent error. Vesicular or bullous

impetigo may also occur by inoculation from scratching the itchy lichen lesions. The complication, however, is not common. The prognosis in cases of bullous lichen does not seem to be any worse than in the cases with the ordinary papular eruption.

ARGYRIA FROM AN UNUSUAL SOURCE.

Davidson (*Journ. Cutan. Dis.*, 1916, p. 605) reports an extraordinary case of argyria in a man who used injections of 10 per cent. argyrol to treat gonorrhœa. About three weeks after he began using it he noticed the backs of his hands becoming discoloured, and in six weeks the skin of the whole body had a muddy tint, and the nose, cheeks, thighs, and hands showed a marked bluish discoloration. The patient used the injections three times daily, retaining the fluid for five minutes. Considering the frequency of the use of silver preparations in treating urethritis, it is extraordinary that argyria does not occur oftener. In this case it is possible that there was some abrasion in the mucous membrane through which absorption took place.

MENINGOCOCCUS MENINGITIS WITH PURPURIC MANIFESTATIONS.

Sharpe (*Journ. Cutan. Dis.*, 1916, p. 659) describes a case of fatal cerebro-spinal meningitis which showed a very extensive purpuric eruption on face, body, and limbs. The purpuric spots varied from petechiæ to large areas of discoloration of irregular outline. The interesting point about the case was that in the hæmorrhagic lesions of the skin the meningococcus was seen. It was seen both intra- and extra-cellularly within the capillaries, as well as free in the tissues. The meningococcus has been found by several observers in the secretions of the nose, the eyes, the urine, subcutaneous abscesses, the bronchi in pneumonia, and in the pus in joint complications, but this is the first time in which the organism has been seen in the skin eruption.

CRYPTOGENETIC SYPHILITIC INFECTION.

Where a patient is seen suffering from an early secondary syphilitic rash, and no primary lesion can be discovered, the physician is apt to conclude that probably a primary lesion did exist, but had been concealed by the patient and overlooked by the physician. Nicolau (*Ann. de Dermat.*, 1916-17, p. 188) records a case where a typical early secondary was present, and in which the spirochaeta pallida was demonstrated in the eruption, and a markedly positive Wassermann was present, and yet, although very careful search was made, no sign of a primary was found in any accessible part of the body. For some weeks before the rash appeared the patient had been under treatment

for what was diagnosed as gastric ulcer. All his stomach symptoms cleared up when he was treated for the syphilis, and it is possible that in that case the stomach or the lower end of the œsophagus had been the seat of the primary. The other possibility was an affection direct into the blood-stream through some unnoticed abrasion. Such cases have been frequently reported. Surgeons injuring their fingers at operations, and applying antiseptics, etc., at the time, have on several occasions developed no primary at the seat of injury, but some weeks later showed a typical secondary eruption. Cases have also been seen where patients, immediately after exposing themselves to infection, have been kept under regular observation by competent authorities, and yet, although they never showed any signs of a primary lesion, later on developed typical secondary rashes.

R. C. L.

NEW BOOKS.

Surgical Contributions from 1881 [to 1916. By RUTHERFORD MORISON, M.B., F.R.C.S.(Edin.). Vol. I. Pp. 439. With 124 Illustrations. Vol. II. Pp. 955. With 131 Illustrations. Bristol: Wright & Sons, Ltd. 1916. Price 42s. net the Two Volumes.

THESE two handsome volumes are dedicated to Mr. Morison's house surgeons, and have been edited by Dr. D'Oyly Grange of Harrogate. We are informed that they were published by request, and that they comprise practically all Mr. Morison's contributions to literature. Synchronising as they do with Mr. Morison's retirement from the acting staff of the Newcastle Royal Infirmary, there is the suggestion of a memorial element, which the reader will be ready to refute, for the impression conveyed is that the author is in the full exercise and practice of his profession.

It is refreshing to find that Mr. Morison has not confined his energies to any restricted field—not that we deprecate specialism, for it can lay claim to a large share in the advance of medical and surgical knowledge, but we find a broader view in the subjects selected for discussion, and an appeal is made to a much wider circle of readers.

In the first volume, which treats of general surgery, we find the author at his best on such subjects as the technique of operations and the treatment of aneurysm; the article on lesions of the semilunar cartilages of the knee is convincing. Newcastle being the centre of one of the largest coal-mining industries, the widest personal experience of a keen observer is at the disposal of the reader.

The second and much larger volume deals with the surgery of the abdomen, in the evolution of which Mr. Morison has played a pioneer's part. Two articles are concerned with the operative treatment of ascites, with which his name will always be associated. We confess to a preference for those articles in which Mr. Morison lets himself go, and states his views and conclusions forcibly and dogmatically, to those in which he merely allows his experience to be recorded in the form of notes, as is the case, for example, in the article on ileo-sigmoidostomy.

In completing a notice of these attractive volumes we feel that they represent a type of medical publications which is, unfortunately, rare in this country, and we would hope, by extending to them a warm welcome, that other hospital physicians and surgeons, when they reach the acme of their experience, would put it on record, in such form as these, to the advantage of those who are to follow in their footsteps.

The Umbilicus and its Diseases: Embryology, Anatomy, and Diseases of the Umbilicus, together with the Diseases of the Urachus. By THOMAS STEPHEN CULLEN, Johns Hopkins Hospital. Pp. xxi. + 680. With 269 Illustrations. Philadelphia and London: W. B. Saunders Co. 1916.

THE last refuge of the general surgeon seems to be in danger. It has long been prophesied that the ever-increasing growth of specialities would in time leave to him only the umbilicus. And now Dr. Thomas Stephen Cullen has produced a monumental work, in large octavo, of nearly 700 pages, devoted to the consideration of the embryology, anatomy, and diseases of the umbilicus, together with the diseases of the urachus. Verily, the umbilicus has come into its own in the matter of literature, and there seems ample material for the establishment of yet another speciality—of umbilicology.

The author confesses that up till the year 1904 he had thought that hernia was practically the only lesion to be noted in this locality. A chance case of cancer of the umbilicus, which he happened to meet with in his practice, sent him to the library in search of any records extant of a similar condition. He was astonished at the wealth of material on the umbilicus which he found scattered through the literature of surgery, and decided to collect and analyse it. The result of his labours astonishes us. His investigation has been most thoroughly done—"the mere assembling of the literature to the end of 1912 took three years"—and, with the aid of a number of collaborators, he has summarised what had been written up to that date so completely that no one need go further than his pages to find the gist of what has previously been written on the subject.

With the aid of a series of excellent diagrams made by Max Brödel, the description of the embryology of the umbilical region is rendered perfectly clear, and the understanding of the various congenital defects that are later described is greatly facilitated. The section on the anatomy of the umbilicus is illustrated by four plates containing sixty drawings of "normal umbilici," no two of which bear more than a superficial resemblance to one another. In fact, the differences are so marked that it is difficult to conceive a normal type. The author, indeed, has had to divide them into no fewer than nine groups.

A chapter is devoted to umbilical infections in the new-born, each form of infection being illustrated with notes of a few typical cases. Umbilical hæmorrhage is dealt with in a most instructive and useful way. The numerous conditions associated with aberrations of the omphalo-mesenteric duct are fully described and profusely illustrated, as are also those of urachal abnormalities. Among other chapters of real clinical value are those on umbilical concretions, tumours, and infective granulomata.

As we have already indicated, this work represents an enormous

amount of literary research, as well as pathological and clinical observation, and it forms a valuable source of reference. A full bibliography is appended to each chapter, and there is a comprehensive index. The illustrations reach a high standard of excellence.

A Text-Book of Surgery. By RICHARD WARREN, Assistant-Surgeon to the London Hospital. In Two Volumes, each of 700 Pages. London: J. & A. Churchill. 1915. Price 25s. net.

MR. WARREN'S *Text-Book of Surgery* has been well received, because it presents many attractive features; it is eminently readable—in itself a notable achievement—and it apparently combines a successful selection of what the student is expected to know at examinations, and of what will serve him as a guide in practice. It wisely refrains from any attempt to cover the whole range of modern surgery, but it gives a good account of the injuries and diseases commonly included in a course of surgery, and a useful résumé of the operations belonging thereto, such as amputation, excisions, the ligation of arteries, and those on the head, thorax, and abdomen, which a man, even if engaged in general practice, ought to know something about.

In a new work there cannot fail to be omissions as well as mistakes. We cannot find any reference to transfusion of blood or to trench feet, and there are doubtless others. We do not agree with the author's teaching on bullet wounds of the abdomen, or with the statements concerning wounds by shot-guns. The account of gas gangrene is meagre; the old fallacy is repeated that gangrene is more likely to follow obstruction of the main artery if the vein is also occluded; the results of treatment of senile gangrene by arteriovenous anastomosis are spoken of in more favourable terms than is warranted by the facts.

Apart, however, from these and other minor subjects for criticism, regarding many of which it may be confessed that there is scope for differences of opinion, it is our pleasing duty to congratulate Mr. Warren on having produced an admirable text-book of surgery, and we have every confidence in anticipating for it a long and successful career.

Diseases of Children. By A. DINGWALL FORDYCE, M.D., F.R.C.P. (Edin.). Pp. 483. With 32 Plates and 84 Illustrations. London: A. & C. Black, Ltd. 1916. Price 10s. 6d. net.

THERE are many excellent books on the subject of children's diseases, but practically all are either very large or professedly non-systematic. This book, written by Dr. Dingwall Fordyce, has provided for the practitioner and student a practical modern manual, systematic, but, at the same time, small and complete. What one notices most about

the book is, that subjects which are of real practical importance to the general practitioner, such as feeding, congenital syphilis, etc., are dealt with exhaustively, whilst such rare conditions (and of much less practical importance) as osteogenesis imperfecta, oxycephaly, etc., are given a clear but short notice. The illustrations are numerous and excellent. The whole book is good, and well worthy to be in the library of every practitioner and student.

Growth in Length: Embryological Essays. By RICHARD ASSHETON, M.A., Sc.D., F.R.S., Trinity College, Cambridge, etc. Pp. 104. With 42 Illustrations. Cambridge: At the University Press. 1916. Price 2s. 6d. net.

THIS valuable contribution to the deeper problems of the early growth of the embryo in length among vertebrata consists of three lectures in the "Advanced Courses in Zoology" in the University of London. In addition, an essay on the "Mechanics of Gastrulation" is reprinted. The whole work, though slight in bulk, "represents the summation of an investigation carried on for more than twenty years."

The first lecture takes up the question of concrescence of the embryo, first considered by His of Leipzig, and is thus stated by Minot, who, in 1897, defined concrescence as follows:—"The passage from the stage of segmentation to the first embryonic stage is effected in vertebrata by means of certain migrations of embryonic material from lateral positions to median positions and subsequent union in the middle line. . . ." Thus, "Concrescence is the typical means of forming the primitive streak in vertebrata." By experiments with bristles placed in the gastrulating egg of *rana temporaria*, the author claims to have shown that part of the embryo is enveloped *in situ* on the egg, and part later by the activity of the blastopore lip. "These are the protogenetic and deuterogenetic regions respectively" (pp. 19 and 20); and he declares, therefore, against the concrescence theory. At page 54 his conclusions are given as follows:—

"To sum up, we may say, both from anatomical observation and from experiment, that growth in length of the embryo in all inanimate chordates must be considered to be due to the origin of a special area of cell production round the lips of the blastopore, which connects the spherical form of the gastrula into the cylindrical form of the later embryo. Since this area of necessity comes into being only after the gastrula is formed, we may recognise two regions in the later embryo. One of these regions is the direct result of the segmentation of the ovum culminating in the gastrula and having the general character of a radially symmetrical form, and this is, on the whole, to be identified with the coelenterate phase of evolution. The region of the body so arising has been named the protogenetic region. The

other region is that of later origin, produced by the proliferation of the lips of the gastrula mouth. This has been called the deuterogenetic region. The part formed from the protogenetic region includes the fore-brain, probably also the mid-brain, the mouth, and possibly the hind-brain as far as the origin of the fifth and eighth nerves, the branchial region and heart, and probably much of the gut. The part formed from the deuterogenetic region comprises the remainder of the hind-brain and spinal cord and tail, the whole of the metamerically segmented mesoderm and, in the *craniates*, the renal organs. As regards the reproductive organs there is much evidence to show that in the craniate chordates the actual germ-cells are, as one would expect, protogenetic in origin, but that they migrate during development into the deuterogenetic region, and here undergo their maturation, and eventually find their way to the exterior by means of the deuterogenetic channels of the coelom or renal apparatus. The same relations between the two regions probably hold good for the amniotes, though in them experimental evidence is obtained less easily."

This is a remarkable generalisation, and it is to be regretted the author was taken away from a piece of work which has great possibilities in regard to heredity. There is, unfortunately, not space to discuss the reprint on the "Mechanics of Gastrulation," which is well worthy of study.

Obstetrics: Normal and Operative. By GEORGE PEASLEE SHEARS, M.D.
Pp. 734. With 419 Illustrations. Philadelphia and London:
J. B. Lippincott Co. 1916. Price 25s. net.

THE author of this text-book, Dr. George Peaslee Shears, Professor of Obstetrics in the New York Polyclinic Medical School, claims to have based his work on a somewhat different plan from that most generally adopted. While not discarding the theory of pure obstetrics, he has endeavoured to introduce the essentials of practical obstetrics wherever possible. With this objective the author has purposely omitted the traditional preliminary chapters on anatomy and embryology.

A chapter is devoted to the important subject of antepartum examination, the importance of which could not be better emphasised than by the introduction of such an excellent series of original photographs.

In the treatment of eclampsia we note that Dr. Shears still strongly advocates the use of morphia, and holds that the objections to its use are purely theoretical. While he refers to the use of *veratrum viride*, he has not apparently had any experience of the remarkable influence of *veratrone* in controlling the convulsions.

Fœtal mortality in labour has a special chapter allotted to it, and we agree with the author's remark that this is an important but much neglected subject. It certainly does not receive, in the majority of

obstetric works, the attention it calls for. The author's experiments with the inhalation of oxygen by the mother, and its effect on the foetal heart, are interesting and likely to prove of practical value.

"Twilight sleep," which is at the present time attracting so much attention, has received full discussion, and we are glad to see that the author sharply discriminates between the true "twilight sleep" as devised and carried out by Kronig and Gauss, and the somewhat haphazard scopolamine-morphine treatment which most of us have carried out for several years.

The author has come to the conclusion, however, that true "twilight sleep" is not suitable in general practice, and advises a partial substitute. He is satisfied with the relief afforded during the first stage of labour by one injection of morphine and hyoscine, followed by a second of hyoscine only; while during the second stage he advises no hyoscine, and relies on the administration of ether only.

The section devoted to obstetric operations is particularly well handled. These are clearly described and well illustrated. The discussion of pubiotomy, for instance, commends itself to us as thoroughly sound.

The author is to be congratulated on a free expression of individual opinion, and on having achieved the task he set himself to accomplish—that of writing a practical work. We consider it eminently practical, and calculated to prove a reliable guide to the general practitioner.

The Art of Anæsthesia. By PALNEL J. FLAGG, M.D. Pp. ix. + 336.
With 136 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1916. Price 15s. net.

IN the words of the author, an American anæsthetist, "this book is intended as a groundwork upon which the student, interne and general practitioner, may acquire a more comprehensive knowledge of the art of anæsthesia."

After discussing what is termed complete general anæsthesia, in which attention is paid to the signs of anæsthesia, the preparation of the patient, and the general precautions to be taken in order to avoid excitement and rigidity, the subject of ether anæsthesia is taken up in detail.

On the whole, this section is the best in the book. The various methods are fully described, the author's preference being apparently for what he calls the "closed drop method," with rebreathing bag and device for using nitrous oxide gas as a preliminary.

Brief, and in the opinion of the reviewer altogether inadequate, chapters are devoted to chloroform and chloride of ethyl. The author's objections to their use are based on their dangers as compared with other available anæsthetics. In view of the widespread

use of both, an adequate description of how to use them and how to minimise their dangers seems called for in a book intended for the use of students and general practitioners.

The author writes with enthusiasm regarding the use of nitrous oxide oxygen anæsthesia with or without ether, and his description of the method and his general remarks thereon are clear and satisfactory.

Short chapters discuss local and spinal analgesia, preliminary medication, and post-operative treatment.

On the whole, if one remembers that the book is written for students, house surgeons, and general practitioners, one is struck by its uneven character. The sections on anæsthesia in general, and on ether and nitrous oxide anæsthesia in particular, are satisfactory. The same cannot be said of the discussion of chloroform and chloride of ethyl.

The book is copiously illustrated, well printed on good paper, and there is an adequate index.

The American Year-Book of Anæsthesia and Analgesia. By Various Contributors. F. H. M'MECHAN, A.M., M.D., Editor. Pp. 420. With 250 Illustrations. New York: Surgery Publishing Co. 1916. Price \$4.

THE initial volume of this year-book is a notable one, and reflects great credit upon the editor and the publishers. It is made up of thirty-one papers, all written by Americans with the exception of two, and they are necessarily of such a disjointed nature that it is impossible to discuss them in a short review. This work was intended to be of an international character; but the war has prevented this, and the editor has been fortunate in obtaining as contributors many of the foremost authorities in America on the scientific, technical, and clinical aspects of anæsthesia. Certain subjects of vital interest are dealt with exhaustively in this volume, the intention being to bring them up to date by collective abstracts in subsequent volumes, and introduce and treat new subjects in a similar way. Some of the papers, such as those by Gatch, Yandell Henderson, Crile, Gwathmey, Levy, and Reithmuller, give the latest views of men who are keenly interested in their special branch and who have already written largely upon it. This volume not only records the year's scientific progress, especially as it affects America, but contains up-to-date papers of practical interest, not only to the general surgeon, but to the anæsthetist, and to other specialists, such as the obstetrician and the dentist. Some of the articles are of a novel character; for example, those dealing with analgesia from the patient's point of view, the use of music during anæsthesia and analgesia, and the treatment of the obstreperous dental patient. The value of many of the papers is enhanced by copious bibliographies and by good and instructive illustrations. We commend

the book to all interested in anæsthesia and analgesia, for they cannot fail to find in its pages much to interest and instruct them.

Pulmonary Tuberculosis. By HALLIDAY G. SUTHERLAND, M.D. Pp. ii. + 290. With 57 Illustrations. London: Cassell & Co., Ltd. 1916. Price 10s. 6d. net.

THIS is an excellent monograph on the subject of pulmonary tuberculosis, and ought to be read by every practitioner who desires to be acquainted with the most recent work on the subject, whether he is interested in it from the pathological and clinical, or from the economic, standpoint. After a clear, but not too elaborate, statement of the etiology and pathology of the disease, the symptoms and diagnosis are carefully gone into with the assistance to be derived from X-rays, bacteriology, and tuberculin. The last naturally receives a large measure of attention. Its theory is clearly and carefully described, and the various methods of applying it for diagnostic and therapeutic purposes are gone into with minuteness and precision. As the author looks upon pulmonary tuberculosis as a systemic infection, spreading by way of the lymphatic and blood-channels, with resultant local lesions in the lungs, he regards open-air treatment, either at home or in a sanatorium, as the sheet-anchor of success in treatment. While a whole-hearted advocate for the vaccine treatment of pulmonary tuberculosis by means of tuberculin, in order to raise the immunising power of the tissues, he recognises the limits of the method, and uses it rather as an adjunct than as the main weapon of attack. The indications for and against its use are carefully described, and rules are laid down for the guidance of the practitioner in its administration, by attention to which this two-edged instrument may be deprived of its dangers and used to the greatest advantage. There is a useful chapter on the dietetics of the disease, and the author calls attention to the necessity for avoiding the gross practice of forced feeding—a method of typical German origin which is neither refined nor scientific. Drugs have their place in the treatment of the disease, but it is a minor place. They must be used for a definite purpose, *e.g.* to check vomiting, or night sweats, or ease the cough, and when that purpose is achieved they ought to be discarded, as they have no influence on the tubercular process and may become actually harmful. Treatment throughout should be based on scientific knowledge, and its main object is to control the intoxication and raise the patient's resistance by a regulated life under conditions of pure air and by avoidance of debilitating influences.

The book is produced in an attractive form, and contains almost no printer's errors. The only one, indeed, that we have observed being on page 223, where the description of the manufacture of artificial Romiss is unintelligible on that account.

NEW EDITIONS.

The Ductless Glandular Diseases. By WILHELM FALTA. Translated and Edited by MILTON K. MEYERS, M.D. Second Edition, with a Foreword by A. E. GARROD, M.D., F.R.C.P. Pp. xix. + 674. With 101 Illustrations. Philadelphia: P. Blakiston's Son & Co. 1916. Price \$7.00 net.

THAT there is need for an authoritative exposition of the diseases of the ductless glands from the clinical standpoint is beyond question, and the scope and aim of this volume is such that these maladies are for the first time fully and accurately described in the light of recent advances in our knowledge of the hormonopoietic system. In addition to those diseases which have their ascertained origin in lesions of the glands of internal secretion, there are a number of others for which such an origin has been suggested. The present state of our knowledge regarding these is also fully considered in an informing but not over-dogmatic manner. To those who have specially interested themselves in the diseases of the ductless glands the author's industrious and ingenious studies are already well known, and have earned for him a very considerable reputation. The present work, covering the whole field of this interesting branch of medicine, is therefore very welcome from a writer whose views are based on wide experience—clinical and pathological—in the first medical clinic, Vienna. As to the features of the volume, there is an excellent foreword by Garrod, in which he emphasises the prominent place which the glands of internal secretion must now occupy in medical thought and investigation.

The first chapter is occupied with such general matters as reciprocal action of the ductless glands, dysfunction, influence on growth, regulation of metabolism, relationship with nervous system, with the hamatopoietic system, pluriglandular disturbances, the ductless glands, and constitution. Apart from difficulties which the translator has occasionally found hard to solve, this is an excellent and succinct introduction to the chapters on the diseases of the various glands. Those on the thymus and parathyroid diseases, occupying some 150 pages, furnish practically an exhaustive account of our present knowledge, while on the other hand it is surprising that the diseases of the thymus, the status lymphaticus, and status hypoplasticus have altogether but eleven pages given to them. To those who are not thoroughly conversant with the subject it may also be surprising that what is known of the conditions of hyperfunction of the suprarenal apparatus requires as lengthy an exposition as that of Addison's disease. Among other matters naturally falling to be considered under diseases of the

sexual glands there are good sections on eunuchoidism and the pathogeny of chlorosis.

Mongolism, chondrodystrophy, the rachitic dwarf, true dwarfism, primordial nanosomia, and infantilism are considered in a chapter on vegetative disturbances that do not depend directly on diseases of the ductless glands.

The clinical descriptions throughout the volume are characterised by a wealth of detail, and the illustrations are numerous and very good. It is unfortunate, from the point of view of the British reader, that the translation does not always make a very pleasing impression. In parts the German formation is much too rigidly adhered to, and the author's meaning is sometimes not very clearly stated. In view of the real value of this book, it is earnestly to be hoped that the translator will recast a number of the Teutonic passages in the text. The mixture of German and American peculiarities is sometimes a little too strong for the English reader. For a book in its second edition there are rather many printer's errors.

The Practitioner's Medical Dictionary. By G. M. GOULD, A.M., M.D.
Third Edition. Revised and Enlarged by R. I. E. SCOTT, M.A.,
M.D. Pp. viii. + 962. London: H. K. Lewis & Co., Ltd.
1916. Price 17s. net.

WE congratulate the publishers on the new form of this well-known dictionary. It is compact and easy to handle, and only three-fourths the bulk of the last edition, although containing about 20,000 additional definitions. New methods, new ideas, new aspects of old ideas, insist on new words. The pity is that too frequently new meanings are given to old words by men who know "little Latin and less Greek."

Thus we have been informed by certain newspapers from time to time that enemy divisions had been "decimated"; and recently we read that the potato crop in this country had been "decimated" by disease. Again, the word "orthopædics" seems to be losing its true meaning in the same wrong way. "Military orthopædics" might have meant the correction of deformities in war babies, but now the term is employed to cover a very wide field. A reference to this dictionary suggests "orthomorphics" as the more correct word in this connection.

The personal names associated with many operations, medicines, tests, syndromes, signs, or symptoms, etc., have nationalities and dates appended, along with a brief description. It is thus a compendium of medical history and appears to be very complete. For example, Chiene's "lines" have a reference and Russell's "bodies" have been resurrected.

We heartily commend this book to the profession. We all have need of such a dictionary, and we can get no better one.

Practical Cystoscopy. By PAUL M. PILCHER, M.D., Consulting Surgeon to the Eastern Long Island Hospital. Second Edition. Pp. 398. With 233 Illustrations. Philadelphia and London: W. B. Saunders Co. 1916. Price 25s. net.

THE second edition of this valuable book is an advance on the first. A new section has been devoted to pyelography, in which its uses and dangers are described.

The chapters on diseases of the prostate and the functional activities of the kidneys have been brought up to date.

The last part of the book—therapeutic uses of the cystoscope—has been amplified, and the newer types of cystoscopes described.

The high-frequency current is advocated for various pathological lesions of the bladder.

The author prefers catheterisation of the ureters to the use of the segregator, and has never found any harmful results from this method.

The text contains many valuable practical hints, chiefly the result of the author's own observations. The illustrations are good and numerous.

The book should be in the library of all who are interested in the surgery of the urinary system.

NOTES ON BOOKS.

IN his *Traumatic Pneumonia and Traumatic Tuberculosis* (Adlard & Son and West Newman, 1916, price 6d. net), Dr. Parkes Weber deals with a subject of much interest and considerable forensic importance. The clinical records of many illustrative cases are given, and the scientific work on the subject is concisely described. The reader will find a full reference to the literature of these traumatic conditions. The book is well worth careful study.

The psycho-analysts are responsible for a stream of literature on the subject of dreams with which ordinary people cannot be expected to keep pace. Dr. Maeder's pamphlet, *The Dream Problem* (Mental Disease Publishing Co., price 60 cents), is not a systematic exposition of the dream problem, but a brief discussion of some points concerning which experts differ. One of Dr. Maeder's objects is to remove some misunderstandings of his previous writings. The paper is of interest, therefore, not so much to the beginner, as to those who are already familiar with current literature on the subject of dreams.

The appearance of a second edition of Dr. Mildred E. Staley's *Handbook for Wives and Mothers in India* (Thacker, Spink & Co., 1916, price 5s. net) indicates the appreciation with which it has been received. The author's aim is the prevention of disease in mothers and their children during their sojourn in a tropical country. No mention is

made, however, of venereal diseases, so prevalent in the East, and which so seriously threaten the health of both mother and child. The present edition will doubtless fulfil the same useful purpose as did the first.

In his *Twelve Lectures on the Modern Treatment of Gonorrhœa* (Heinemann, price 5s.) Dr. P. Asch of Strassburg gives a clear and practical account of our present knowledge of the subject. The work is translated and annotated by Dr. Faxton E. Gardner of New York, whose notes are brief and to the point and do not trespass on the text proper. Electrargol injections are strongly recommended for the abortive treatment of epididymitis. In certain cases, apparently cured, but in which it is important to make certain that the cure is real, the author has found provocative injections of a vaccine (50 to 100 million) useful, and in this experience the present reviewer agrees.

Dr. Charles Russ proposes *A New Treatment of Gonorrhœa* (H. K. Lewis, Ltd., price 3s. net). He thinks many of the methods at present in use are futile, because the agents employed fail to reach the recesses of the urethra. As a result of experimental treatment of cultures in test-tubes by electric currents he finds that the organisms collect at the positive electrode, and his new treatment consists in applying this fact to the human urethra. His conclusions are not always logical; it is advised to reverse the current in some chronic cases. No series of cases is given. A trial of the electrical treatment we have made has not yielded the results here claimed for it.

Fleas as a Menace to Man and Domestic Animals, by James Waterston, B.Sc. (British Museum, 1916, price 1d.), belongs to the Series of Economic Pamphlets published by the British Museum. It gives an interesting and instructive account of the main features of the structure, habits, and life-history of fleas; touches upon the connection between fleas and the spread of bubonic plague; and points out the potential danger in allowing these insects to breed about dwellings, etc. Details of flea control, adapted more especially to conditions prevailing in this country, are also given. There is a bibliography of useful papers.

REPORTS, TRANSACTIONS, ETC.—*Collected Papers of the Mayo Clinic, Rochester, Minnesota*, Vol. VII., 1915 (W. B. Saunders Co., price \$5.50 net). With unfailing regularity these collected papers appear, under the able editorship of Mrs. M. H. Mellish, and the bulk of work emanating from the Mayo Clinique shows no sign of diminishing, nor does the standard in any way fall off. The editor, indeed, to avoid the present volume swelling to excessive proportions, has found it necessary to hold over some papers and to summarise others. To attempt a detailed analysis of the various papers included in the present issue is impossible, and to select individual contributions would be invidious where all are of first-class importance. Our readers are already familiar with the qualities of this publication, and no worker in surgery can afford to overlook it.

The chiefs of the clinic are responsible for the greatest number of papers, and the variety of subjects dealt with by them amply testifies to their versatility as operating surgeons and investigators.

The subject-matter is conveniently arranged for purposes of reference and special study. The affections of the alimentary canal and of the urogenital organs bulk largely. A section is devoted to the ductless glands, and serves to illustrate the advances that have been made within recent years in the understanding of these organs and in the treatment of the diseases with which their disturbance is associated. Amongst the selection of general papers with which the volume closes we find a title—"Snuff-Poisoning"—which we do not remember having seen before. It would appear that "the use of snuff, a most pernicious habit . . . has been creeping into this country (America) in the last few years," and that it "undermines the physical, moral, and mental health."

Throughout the volume the terms "roentgenolic" and "roentgen," used as adjectives, replace the more euphonious terms "radiographic" and "X-ray." There may be reasons why the name of the distinguished discoverer of the Roentgen rays should be preserved in the nomenclature of the subject, but why drop the capital R?

International Clinics, Vols. I. and II., Twenty-Sixth Series, 1916, edited by H. R. M. Landis, M.D., Philadelphia, U.S.A. (J. B. Lippincott Co.). The articles in volume I., some of them beautifully illustrated, well repay careful study. A 'general review of medicine for 1915 occupies about a third of the book and is well and completely done. Sydenham's chorea receives very full treatment, and the excellent results of the intravenous injection of phenol will be noted with interest. Drug therapy in cardiovascular disease, and that mysterious disease, pellagra, are among the subjects dealt with by authoritative writers. An extremely interesting case of syphilitic nephritis, with pseudo-chylous ascites, is communicated by Dr. Parkes Weber and Dr. Schmidt.

Surgery is well represented by articles on "Spina Bifida" and "The Problem of the Prevention of Surgical Shock," together with other shorter papers.

The second volume contains much of interest both to the general practitioner and to the specialist. The war is responsible for two papers, one on "Tetanus" and one on "The Present *Rôle* of the Orthopaedic Surgeon." Much information will be obtained from a paper on "Unusual Abdominal Lesions," in which some beautiful skiagrams are incorporated. Professor Halstead writes on "Cancer of the Rectum." Dysthyroidism is exhaustively dealt with, and auricular fibrillation, in the light of modern knowledge, forms the subject of another excellent article.

In the realm of obstetrics the value, both to mother and child, of

pre-maternity supervision is clearly demonstrated and forcibly advocated. All the articles reach a high level of excellence, and the illustrations are extremely good.

Transactions of the American Laryngological Association (37th Annual Meeting), (1915, pp. 392, New York, McConnell Press). The papers in this volume maintain the high standard we have learnt to expect from the American Laryngological Association. The writings of Goodale and Chappell bring before us the excellent scientific work on Hay Fever now being done in the United States. Other features of interest are the papers on "Fluoroscopic Bronchoscopy," by Fletcher Inglis; on "Intranasal Operations on the Frontal Sinus," by Mosher and also by Freer; on "Suspension Laryngoscopy," by Lynch; and on "The Tonsils," by Richardson, Hudson-Makuen, and Barnes. The President's address is interesting, because it shows the opposition which the specialty of laryngology met with in the early days. A distinguished general surgeon, when introducing Solis Cohen to his first class, stated that the lecturer was "specialising a cubic inch of the body," and that he (the introducer) had no doubt that "someone would soon specialise the umbilicus." The volume contains a very interesting article, by Greenfield Sluder, on "The Symptom-Complex Associated with Lesions of the Nasal (Meckel's) Ganglion." The illustrations are good, but might have been more numerous.

BOOKS RECEIVED.

CARLSON, A. J.	The Control of Hunger in Health and Disease.	
	(Cambridge University Press as agents for University of Chicago Press)	9s.
CHATTERJI, K. K.	A Handbook of Surgical Operations	(Butterworth & Co.) 7s. 6d.
DAVIS, G. G.	Applied Anatomy. Fourth Edition	(J. B. Lippincott Co.) 24s.
FURNAC, J. R. DE, and A. J. ROSANOFF.	Manual of Psychiatry. Fourth Edition	
	(J. Wiley & Son and Chapman & Hall, Ltd.)	10s. 6d.
HURST, A. F.	Medical Diseases of the War	(Edward Arnold) 6s.
THE INSTITUTIONAL CARE OF THE INSANE.	Vol. III.	(Johns Hopkins Press) —
INTERNATIONAL CLINICS, 1916.	Vol. III.	(J. B. Lippincott Co.) —
MACCALLUM, W. G.	A Text-Book of Pathology	(W. B. Saunders Co.) —
MUIRHEAD, I. B.	Extra-Ocular Pressure and Myopia	(Bale, Sons & Danielsson, Ltd.) —
STILES, P. G.	Human Physiology	(W. B. Saunders Co.) —
STITT, E. R.	Practical Bacteriology, Blood Work and Animal Parasitology. Fourth Edition	(H. K. Lewis & Co., Ltd.) 9s.
THOMAS, B. A., and R. H. IVY.	Applied Immunology. Second Edition	
	(J. B. Lippincott Co.)	16s.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

Housing and Health.

ONE of the most urgent problems to be faced in the regeneration of the country after the war is that of housing; not only the housing of what we call "the poor," but also that of the classes somewhat higher in the social scale. This question has not been raised by the war, but circumstances have forced it on the attention of many who previously gave it no more than a passing thought. Workers amongst the dependants of soldiers and sailors, health visitors, child-welfare workers, and others have been brought into direct physical contact with people and places previously unknown to them, and have come to realise some of the handicaps under which the poor and the labouring classes live. Many who previously looked upon "the housing question" as a vague proposition, which in some mysterious way concerned "the authorities," have come to realise that it is the fundamental question in social reform, and concerns every working member of the community. The one half of the world, who have been proverbially ignorant of how the other half live, have somehow had their eyes opened, and have come to see that that other half live under conditions which often scarcely make life worth living, and always make it needlessly hard. Suggestions for improvement have ever been met by the apparently unanswerable objection of the expense. But the war has, at least, taught us that when money is required for the good of the State it can be found. . A single week's expenditure on the destructive process of war would go a long way in the reconstruction of slum districts. The experience of the Peabody Trust in London is a standing example of the possibilities. At an outlay of something under £2,000,000 large areas of insanitary property were pulled down and replaced by modern cottages and small tenements, providing housing accommodation for close upon 23,000 people.

The question of the "Influence of Housing on Health" was recently raised by the Medical Officer of Health for Edinburgh in a paper read at Glasgow. The full significance of the facts brought out by Dr. Maxwell Williamson can only be appreciated by a study of the

statistical tables given in his paper, which we cannot here reproduce. Some of the general deductions, however, are sufficiently striking. Thus it is found that the proportion of the population spending their lives in houses consisting of one or two rooms in Paisley is 64·9 per cent.; in Dundee it is 63 per cent.; in Glasgow 62 per cent.; in Greenock 58 per cent.; and in Edinburgh 37·2 per cent.

In the city of Edinburgh nearly 100,000 people live more than two in a room; 40,000 more than three in a room; and over 12,000 more than four in a room. In Glasgow the conditions are much worse.

The effect of these conditions is shown in the death-rate, which follows the accepted rule that the death-rate of a community increases with the density of the population. Dr. Williamson has found, from an investigation carried out in the different wards of the city of Edinburgh, that the death-rate increases almost exactly in proportion to the number of one- and two-roomed houses in the district; ranging from 12·2 in the residential district of Merchiston, with its 811 small houses, to 21·2 in St. Giles, where 2913 houses are of one and two rooms. If *congested districts* are taken in place of the municipal wards the influence of the density of the population on the death-rate is further shown. The average density in the city is 28 persons to the acre, and the general death-rate 16·4 per thousand. In the densely populated Canongate district the density of persons to the acre is 202, with a death-rate of 22·5 per thousand. Figures are given to prove that the incidence of sickness—*e.g.* fevers, phthisis, etc.—also varies directly with the density of the population and the number of small houses. In 1912, of the cases of phthisis notified to the Medical Officer of Health, 6·9 per thousand occurred in houses of one room; 5·6 per thousand of two rooms; 3·5 per thousand of three rooms; and only 1·4 per thousand in houses of four rooms and over. The figures for 1910 and 1914 are also given with similar results. “The tremendous significance of this conclusion, if a correct one, lies in the fact that, meantime, untold sums of money are being spent on sanatorium and institutional treatment in an attempt to cure a disease one at least of the main causes of which is receiving the scantiest possible attention.” It is suggested with some show of reason that the process should be reversed; that money should be spent on preventing the disease by improving the housing conditions and so obviating the necessity for sanatorium or any other form of treatment.

The influence of the housing conditions on infant mortality is well brought out in an elaborate table, which should be studied by all who are interested in the subject of child-welfare.

Dealing with the question of the cure of the housing evil, Dr. Williamson emphasises the need for an early solution of the problem, and strongly expresses the opinion that no satisfactory solution can be hoped for through the operations of private enterprise. The natural

relationship of landlord to tenant precludes the possibility of improvement coming from proprietors. The question is a financial one, and it is to the Government that we must look for the necessary funds. When the Government is prepared to grant sufficient money "there should be no difficulty in ruthlessly dealing with the great tracts of uninhabitable property which are to be found in every city. All overcrowded districts, all unduly subdivided tenements, all areas of property which statistics prove to be unhealthy for human habitation, will require to be, without the slightest compunction, closed and removed."

Without aspiring to the ideal garden city, or even to the more ambitious of the town-planning schemes that have been advocated, Dr. Williamson believes that even in large centres of population "it is possible, by carrying out well-matured schemes, to house the people under healthy conditions, and at rents which would be within the means of the inhabitants."

The "colony houses" of three to five rooms, such as those in the Stockbridge district, with rents that run from £12 to £16, are favourably spoken of; in them the death-rate is 14·7, as contrasted with 16·4 over the whole city, and the child mortality 15, as contrasted with 42·9 for the city. The disease incidence in the district is correspondingly low. The conditions in this colony area are contrasted with those of a tenement area of the same extent in St. Leonard's district, and the statistical table appended abundantly bears out the contentions of the Medical Officer of Health.

**Restrictions on the Use of
Medicinal Glycerine.**

THE Ministry of Munitions announces that owing to additional demands for glycerine for war purposes it has become necessary to place further restrictions on the issue of medicinal glycerine, and that supplies in future will be reserved for the manufacture of the preparations of the British Pharmacopœia, and for such uses of special importance as may be sanctioned by the Ministry of Munitions. These supplies will, however, be small, and must be used with the utmost economy.

Applications for permit to obtain supplies should be addressed to the Director of Propellant Supplies, 32 Old Queen Street, Westminster, S.W., and should give the following particulars:—1. Quantity applied for. 2. Stock of glycerine held. 3. Purposes for which supply is required (in case of extra British Pharmacopœia preparations, formulæ should be given). 4. Applicant's average yearly consumption of glycerine for above purposes. 5. Name and address of proposed suppliers.

The medical profession have been informed of the need for economy

in prescribing glycerine, and it is anticipated that the requirements for dispensing will be greatly reduced. The stocks of glycerine in the hands of pharmacists should be sufficient to meet these reduced requirements, and therefore no glycerine will be issued for dispensing meantime.

The surplus stocks held by pharmacists and all stocks held by retailers who are not in a position to use them for these restricted purposes should be disposed of either to other pharmacists who are short of stock, or to wholesale houses for making British Pharmacopœia preparations.

War Honour.

TEMPORARY COLONEL G. LOVELL GULLAND has recently been awarded the C.M.G. for distinguished services in the field.

**Triple Qualification
Passes.**

AT the examinations of the Board of the Royal College of Physicians of Edinburgh, Royal College of Surgeons of Edinburgh, and Royal Faculty of Physicians and Surgeons of Glasgow, held at Edinburgh in January :

The following candidates passed the *First Examination* :—Sayed Chaleb and Arthur H. Jacobs ; the *Second Examination*—Andrew W. Smith, Gwilym ap V. Jones, Thomas R. O'Keeffe, Alexander F. Caddell, George M. Raeburn, Norman J. Patterson, Thomas Hall, James Douglas, and Jatindra Kumar Sen ; the *Third Examination*—Hugh E. C. Collins, William O'G. Donoghue, Cecil S. Baxter, Andrew F. Briglmen, Hassan A. Madwar, John K. Steel, and Arthur S. Hughes.

The following candidates, having passed the *Final Examination*, were admitted L.R.C.P.E., L.R.C.S.E., L.R.F.P. & S.G. :—William Fidler Mason, John Alexander Tolmie, James Wallace Gordon, Robert Frederick Claude Hamilton Buchanan, Alfred Black, Yeshwant Narayan Kadam, John Berry, Alfred David Gorman, and Wendell Thomas Garretson.

THE GRAFTING OR TRANSPLANTATION OF
TISSUES.*

By ALEXIS THOMSON.

THE grafting of tissues has not been adopted to the same extent in this country as in the continental schools and in those of North America. It is possible that the experimental side of the subject has been a handicap with British surgeons, not only in relation to its investigation in the laboratory, but also in hospital practice, where we hesitate to adopt procedures which have a markedly experimental character. We might instance the venturesome experiments of Tuffier, in which, having conserved all varieties of tissues obtained at operations in "cold storage," he inserted them under the most varied conditions into the tissues of other individuals; or those of Lexer, transplanting portions of tissue, often of considerable size, from the cadaver; or, finally, those of Carrel, transplanting entire organs from one part of the body to another of the same animal, or from one animal to another.

Similar investigations in this country have been confined to a narrow field, and, so far as I am aware, are chiefly represented by the experiments of Syme and of Macewen on the regeneration of bone.

The subject is one of no little importance in surgical practice, and one in which considerable progress is likely to be made in the future; moreover, the present war is providing upon a vast scale men who have lost tissues or portions of the body which can often be replaced by grafting, with a consequent return of function which cannot be obtained in any other way. The time is well chosen, therefore, for a review of the subject, and this we shall attempt in the following pages.

Just as the individual tissues differ from one another in relation to regeneration and repair, they differ quite as markedly in relation to grafting or transplantation. Those tissues that repair well can be grafted with success for the obvious reason that the tissue elements of a graft must be capable of active regeneration in order to maintain themselves in their new surroundings.

When an animal dies its tissues do not all lose their vitality at the same time; the more highly specialised tissues, such as the

* An introductory lecture delivered to the Class of Surgery at the opening of the Winter Session of the University of Edinburgh, October 1916.

nerve cells of the brain or cord, perish in a matter of minutes, while tissues, such as the skin, the connective tissues, and bone, retain their vitality for some hours; their capacity of doing so, in spite of the arrest of the circulation, is one of the essentials for success in grafting.

It is to be remembered also that in the living body *no tissue is permanent*; the epidermis, for example, is continually being shed or worn away, the wastage being made good by regeneration from the deeper layers; in other tissues the effete elements undergo disintegration and absorption, and are similarly replaced by regeneration. Transplanted tissues are the seat of similar changes; if disintegration and absorption predominate, the graft disappears; if, on the other hand, regeneration keeps pace with absorption, the graft maintains its existence.

There are *degrees of success in grafting*: in the most successful examples the transplant becomes continuous throughout with the surrounding tissues, there is no visible necrosis along its edges, and the regeneration of its elements is vigorous enough to ensure its permanence in shape, structure, and function. I show you a calvaria, for example, in which a portion of bone—that had been completely detached for half an hour and then replaced—has healed in perfectly; the specimen came into our possession on the death of the patient, three years later.

There is an intermediate degree of success in which disintegration of tissue predominates in the first instance, to be followed by an active regeneration, it may be in the remains of the graft or in the tissues in the immediate neighbourhood. In the early days of skin grafting it was not an uncommon experience to see the individual grafts disappear in the discharge and then a vigorous growth of epithelium make its appearance, such as would not have occurred without the grafts.

Another example of incomplete success is where the tissues of the transplant undergo disintegration, but as it becomes encapsulated by newly formed connective tissue, like a foreign body, neither absorption nor substitution can take place, and it maintains its shape and size; the result may be quite successful, however, from the clinical point of view, as, for instance, where a portion of fat has been employed to fill up a cavity.

As there are degrees of success in grafting, so also there are *degrees in failure*; apart from the necrosis and sloughing due to bacterial infection, the transplant may be thrown off by a process resembling suppuration, which, according to Lexer, is non-bacterial,

and which he has only seen in rare instances in which the graft has been taken from a tuberculous or syphilitic subject; the writer has not seen any illustration of this.

It is not uncommon to see failure result in cases in which a segment of one of the long bones has been inserted into the gap between the fragments of an ununited fracture; not only may regeneration fail to make good the wastage from absorption, but there may be also the substitution of the bone by connective tissue, with the result that the fracture remains ununited. This variety of failure is to be apprehended when the distal fragment has undergone atrophy and yields a feeble shadow in the X-ray picture.

Auto-, Homo-, and Heteroplasty.—The transference of a portion of tissue from one part of the body to another part of the same animal—*autoplasty*—affords the best prospect of success, and should therefore be practised whenever possible.

The transference from one animal to another of the same species—*homoplasty*—is the next most likely to succeed, and in the case of the simpler tissues, such as epidermis, fat, and bone, may be employed with confidence.

Heteroplasty—the transference of tissues from one species of animal to another, in practice from the lower animals to man—is the least successful of the three varieties; experiment has shown that a greater measure of success has been obtained in grafting from the ape to the human subject than in the case of other animals.

It has been suggested that the obstacle to success in heteroplastic transplantation lies in anaphylaxis, while in homoplasty there are biochemical influences that interfere with healing. As Ullman expresses it, the cell protoplasm, specific for each organism, varies with the individual; there are as many protoplasms as there are individuals; in homo-transplantation the appearance in the body of a foreign protoplasm calls forth ferments into the circulation which destroy the transplanted tissue.

In practice, apart from the method employed—auto-, homo-, or heteroplastic—there are certain details making for success that merit attention: the graft must not be roughly handled, allowed to dry, or be subjected to chemical irritation; it must be brought into absolutely accurate contact with the new soil; all bleeding must be arrested, so that no clot intervenes between the graft and its new surroundings; and it goes without saying that all infection must be excluded.

At one period in the evolution of grafting it was hoped that tissues removed at operations might be kept in cold storage, and used as necessity arose. In one of the best known continental clinics visitors were struck with the care with which every piece of tissue was collected and preserved; an amputated limb was regarded as a mine for future transplantations; the skin, the nerves, the tendons, the bones, all were dissected out, bottled and labelled. It was found, however, in practice, that while these cold storage tissues have a limited sphere of usefulness in the filling of cavities, they are not suited for grafting; they have lost the capacity for regeneration, and as they disintegrate and are absorbed, the whole burden of repair falls on the tissues in the neighbourhood.

Grafting of the Individual Tissues.—Of all tissues, the blood is that which can be transferred from one individual to another with the greatest likelihood of success and with the minimum sacrifice of tissue elements. Being always a homoplastic transfer, the new blood strain is not always tolerated by the old, in which case biochemical changes occur, resulting in hæmolysis, which correspond to the disintegration of other unsuccessful homoplastic grafts. In the transfusion of blood, close relationship between the donor and the recipient was formerly regarded as a condition of success, but wider experience has not substantiated this view. Along with Mr. J. M. Graham we have frequently transferred blood from husband to wife and wife to husband with complete success.

The transplantation of epidermis is one of the most uniformly successful of all grafting procedures. The method usually employed is that introduced by Thiersch, which consists in shaving off strips of epidermis and transferring them directly to a raw surface, or, if a granulating one, it is rased with a knife, in either case making certain that there shall be no blood between the grafts and the surface to which they are applied (the details of the procedure is beyond the scope of this article). The whole thickness of the skin or cutis is similarly employed to cover a raw surface, but, if successful, it yields a stronger and more enduring covering than is obtained from epidermis alone.

Isolated successes are on record where a slice of skin and fat from a finger, an ear, or a nose has healed, even when, as has occurred in such cases, the severed part has been brought wrapped up in newspaper, a varying number of hours having elapsed since the receipt of the injury. In transplants of cutis the hair is

usually shed, but regenerates, although slowly; nails are also shed, and if they regenerate are usually misshapen. The permeation of new nerve fibres into the graft is a gradual process; sensation reappears round the edges in about six weeks, and later creeps in towards the centre.

The occasional failure to unite of a completely detached flap of skin has led to the adoption, whenever feasible, of a *two-stage method*, in which the flap is left in continuity with the surrounding skin at one or both of its extremities until it has become adherent in its new position and its nutrition thereby ensured. Figures were shown illustrating the method: a defect of skin on the dorsum of the hand is filled by skin obtained from the abdominal wall; the latter is raised in the form of a bridge, beneath which the hand is inserted until accurate contact is secured; the edges of the flap are united to the edges of the gap by a number of stitches, and the arm fixed to the trunk by a few turns of a plaster of Paris bandage. After a period of about three weeks, by which time the flap has taken firm root in its new bed, the piers of the bridge are divided, and the hand freed from the abdominal wall. The defect in the skin of the abdomen is very much larger than the flap taken from it, but if the edges are mobilised by undermining, there should be no difficulty in bringing them together.

In both the one- and the two-stage methods it is essential that the flap be cut generously, to allow both for the immediate and the subsequent contraction; a rough guide is to cut it about one-third larger than the gap it is to occupy. It goes without saying that it must not be subjected to the slightest tension or to undue pressure.

In the two-stage method of cutis grafting, when the defect is in the skin of the upper arm, the flap may be taken from the thorax; when the defect is in the leg, from the other leg; when the defect is in the penis or urethra, as in hypospadias, the flap is taken from the scrotum; and, lastly, in the nose, from the skin of the upper arm—the so-called Italian method of restoring the nose.

It is a common experience in fractures of the jaws that a tooth, more or less completely torn from its socket, may, if replaced, take root again and retain its vitality; similarly, a tooth extracted by mistake for another may be successfully replaced in its socket. It was only one step further to extract a tooth from an overcrowded jaw and insert it in a hole made for the purpose in the jaw of a person who is short of teeth. Such transplanted teeth have upon occasion fulfilled all that was expected of them, even

for many years, but as continuity of the pulp with the vessels and nerve of the jaw is not re-established, a process of disintegration and absorption ensues, with erosion of the root, which ultimately breaks across.

It is on record that, owing to the difficulty of arranging that the donor of the tooth should present himself at the same time as the would-be recipient, recourse has been had to the historic procedure of John Hunter, of conserving the vitality of the donor's tooth by grafting it into the comb of a cock, thus rendering it possible to supply suitable teeth at the required moment.

Transplantation of mucous membrane follows that of skin in most of its details, but the difficulty of ensuring asepsis has been a serious handicap; success, however, has attended the formation of a new eyelid from the tissues of the lip, and the mucous membrane of the appendix has been employed to make good a defect in the urethra. In this procedure the muscular and serous coats are removed, and, to secure favourable conditions for healing, the urine is diverted.

The experimental transplantation of portions of blood-vessels has been uniformly successful, even under heteroplastic conditions, such, for example, as the insertion of a segment of the aorta of a rabbit into a gap in the carotid artery of a dog. In the human subject a segment of the internal saphenous vein is the transplant usually employed, both because it is readily accessible and because it can be sacrificed without detriment. Under these conditions the higher pressure in the arterial system leads to a thickening of the coats of the vein, followed by a disappearance of the muscle bundles; the sclerosis is due to the formation of fibrous tissue (Carrel). A segment of the same vein has also been employed for ensheathing purposes; for example, when a nerve trunk has been sutured after division, the investment by the vein prevents the young nerve fibres going astray, and also prevents their being invaded by granulation tissue derived from the surrounding connective tissue.

Although itself of poor vascularity, the fascia lata of the thigh has proved a useful structure for grafting purposes, and that with widely different objects; it serves admirably for making good a defect in such a structure as the dura mater and for strengthening the line of suture in operations for the cure of abdominal hernia, and in ankyloid joints, the interposition between the bones of a suitably shaped flap of fascia lata, especially when a layer of fat is taken with it, prevents the bones re-uniting and makes possible

the recovery of movement. In operating for the cure of hernia and hydrocele, the peritoneal sac is sometimes found to be capable of being put to the same use as the fascia lata. In intra-abdominal operations a flap of omentum is sometimes used to reinforce a line of suture that is not quite perfect, but care must be taken, when such a flap remains in continuity with the omentum, not to provide a band that might afterwards cause intestinal obstruction.

Adipose tissue lends itself readily to grafting purposes, but has been used chiefly for cosmetic purposes, filling up a cavity or depression in the face resulting from an antecedent injury or operation. The fat may be derived from the buttock of the patient, or from any other source, such as an omental hernia, or a fatty tumour, the homoplastic method being quite successful.

The highly specialised character of striped muscle fibres and their behaviour in the repair of wounds of muscle give little or no hope of successful transplantation; a grafted portion of muscle rapidly degenerates, both because of insufficient nutrition and of being cut off from its nerve supply. Being converted into connective tissue, it may be employed to fill up a cavity in bone where fat is not obtainable.

Nerve tissue employed for grafting purposes has been the cause of much disappointment. While it was early recognised that the fibres of the central nervous system, being devoid of a neurilemma or nucleated sheath, were as incapable of transplantation as they were of repair, it was hoped, if not anticipated, that the fibres of the peripheral nerves, possessing, as they do, a nucleated sheath, would shine by contrast. And so they do when the effort consists in forming new nerve fibres, as is called for in the reunion of a divided nerve, but to maintain an independent existence, in the form of a graft, would appear to be an impossibility. The nerve fibres undergo degeneration and absorption and their place is taken by connective tissue. Whether such connective tissue is to be preferred to the ordinary variety for grafting purposes is more than doubtful, notwithstanding the wonderful procedures recorded in the newspapers of the bridging of a gap in a nerve trunk by a nerve from a dog or rabbit or from an amputated limb. We believe that a segment of vein or a strand of fascia would serve equally well for bridging purposes.

Both auto- and homoplastic transplantation of tendons has been extensively and successfully employed in the treatment of paralysis resulting from poliomyelitis, less frequently in other conditions, such as bridging the gap in the tendon of a finger when

a portion has sloughed in the severer forms of whitlow, or the lengthening of tendons in ischæmic contracture of the muscles of the forearm or the repair of torn ligaments. In practising the autoplasmic method, the palmaris longus tendon above the wrist and the extensor tendons of the outer toes are to be recommended as being not only accessible, but also can readily be dispensed with; a segment of the saphena vein may, with advantage, be made to ensheath the sutured tendon.

The transplantation of periosteum and bone is one of the earliest procedures in the history of grafting, and still remains one of the most important in practice. The names of Syme, Ollier, and Macewen are honourably associated with its introduction and the experimental work therewith connected.

At one period it was quite a common practice to employ for grafting purposes dead bone, sometimes of the cold-storage variety, sometimes from the cadaver, sometimes such curiosities as bone preserved in various solutions, calcined bone, and the like. There is nothing to recommend such practices; dead bone is treated by the tissues as a foreign body, and when it cannot be extruded, as the tissues would apparently like to do, it is either replaced by new connective tissue, which, being derived from the surrounding bone, may ultimately ossify, or it is encapsuled by similar tissue, although I do not recollect any example of this. Living bone should always be employed, and although successes have been obtained in man with bone taken from other animals, the autoplasmic method, as in other tissues, is to be preferred. There should be no difficulty in obtaining suitable material in sufficient quantity, as the tibiæ, fibulæ, scapulæ, and ribs are all available. If there happen to be material from operations, such as resection of the tarsal bones in young subjects for club-foot, wedge-osteotomy for knock-knee, it should be taken advantage of; even the amputated limb of a young subject may furnish a useful graft, provided the condition for which the amputation has been performed is taken into account.

There is difference of opinion as to the necessity or otherwise of retaining the periosteum along with the portion of bone to be grafted; we have usually done so, not so much because it may form bone in its new surroundings, but because it favours the accurate union of the graft to the edges of the gap it is to occupy, and by encouraging the invasion of blood-vessels, the early nourishment of the graft is promoted. On the other hand, it cannot be denied that subperiosteal resection of the shaft of a long

bone or of a rib is very much easier and causes much less damage to the surrounding soft parts. The success attained in cases where the wedge of bone resected from the tarsus constitutes the graft tends to show that the addition of periosteum is not essential. A less important detail concerns the size of the grafted portion of bone; it has been recommended that a large portion should be broken into small fragments, as likely to "take" better, but we are quite satisfied that this is not only unnecessary but is also undesirable.

The following may be quoted as *examples of bone-grafting* :— A defect in the flat bones of the skull is made good by a portion of similar size derived from the outer table of the adjacent bone or by a portion taken from a rib or a tibia. Portions of bone removed at operations may, if laid aside and wrapped in gauze wrung out of saline solution, be replaced at the end of the operation with reasonable certainty of perfect healing; such is an example of replacement of tissue rather than of transplantation, but it affords an instructive stepping-stone to the latter.

When a portion of the shaft of one of the long bones has been lost, as in a resection for sarcoma, it is replaced by a portion of the fibula from the patient; or if, as in the case of the femur, a stronger substitute than the fibula is required, by the shaft of a bone obtained from a freshly amputated limb. The method of inserting and fixing the transplant varies with the condition in each case, but it is usual to point one of its extremities and drive it into the medullary canal of the bone of which it is to form a part. Special saws and other instruments for cutting and trimming bone, such as those devised by Albee, are essential for accurate work. We have used both fibulæ for grafting purposes without noticeable impairment of function such as one would expect from interference with the attachments of the muscles taking origin from the fibula. It was also noticed that when the sarcoma recurred, some months after the operation, the extension of the disease involved the grafted bone in precisely the same fashion as it did that of the original shaft.

It is not overstating the case to say that cases of ununited fracture of such a hopeless character as to call for amputation of the limb may be caused to unite and provide a useful limb with the help of grafting. The "hopeless" feature of the cases referred to consists in the atrophy of the bone, especially in the distal fragment or fragments; this is shown by the feeble shadow depicted in radiograms and by the condition of the bone as seen at

the operation; it may be actually cut with the knife instead of requiring the saw, holes are bored in it with surprising facility, and the gripping of a screw-nail is out of the question. It is obvious that profound changes have occurred in the nutrition of the tissues at and beyond the site of the fracture; it may be presumed that the nutrient artery of the bone has been destroyed, and it is likely, too, that the innervation of the tissues has also been interfered with.

Such being the condition of affairs, no operation intended only for the fixation of the fragments has any prospect of success; the defect in nutrition must be made good by the introduction of living bone, auto- or homoplastic in origin, but endowed, so far as possible, with the maximum capacity for regeneration. We have usually made use of the fibula of the other limb, but it would be better to point both ends of the transplant and insert them into the medulla of the respective fragments—a *combined operation of grafting and fixation*. The consolidation of the fracture is slow, but the tedium of it is relieved by successive skiagrams in which the nutritional influence of the graft constitutes a study of no little interest.

THE INCIDENCE OF BOVINE INFECTION OF TUBERCULOSIS IN CHILDREN.

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TUBERCULOSIS, in its clinical aspect, was known in the time of Hippocrates, but it was not until the seventeenth century that observation was made by Sylvius (1614-1672), indicating the close relationship of the tuberculous nodule to phthisis. Reid (1785) and Baillie (1793) contributed largely to our knowledge of the gross characteristics of the tubercle, but our first definite insight into the nature of the disease occurs in the work by Bayle (1774-1816), in which he dwelt, in more detail, on the structural characters of the tuberculous nodule. Later, in 1819, Laennec¹⁷ recorded the results of his study in a series of cases of tuberculosis of the lung, and described, with great accuracy, the pathology of the disease. This ended the first period of the development of our knowledge of the disease.

The commencement of the second period was marked by the work of Villemin (1868), who first demonstrated the infective nature of the disease by a number of careful researches, the result of which showed that the tuberculous material derived from the human and bovine sources produced, in both cases, similar lesions in the experimented animals, and, further, that rabbits inoculated with the tuberculous matter from the human subject did not contract the disease so severely as when the inoculum was obtained from the tuberculous cattle. These findings were soon confirmed by Gerlach¹⁰ in 1870, and, independently, in the same year by Klebs,¹⁵ whose experiments appeared to indicate that human and bovine tuberculosis came from the same source.

The third period saw the brilliant discovery of the tubercle bacillus by Koch in 1882, the significance of which was not at first fully realised. Time was required in revolutionising older ideas, but, despite much opposition and severe criticism, a proper conception gradually but ultimately prevailed that *Perlsucht* and human tuberculosis possessed, in all essential particulars, the same pathological characteristics, thus establishing, beyond dispute, the ætiological identity of the two diseases. In 1891 the subject of the communicability of the disease between man and animals was investigated by Delépine,⁴ who then pointed out the dangers of infection by way of the alimentary canal, associated with the consumption of tuberculous cow's milk. Our knowledge was further enlightened by the work of Theobald Smith²³ (1898), which showed that the tubercle bacilli derived from the tuberculous tissues of cattle differed, in fundamental particulars, from those obtained from cases of human pulmonary tuberculosis.

The fourth and final period was one characterised by the famous announcement made by Koch¹⁶ in 1901 before the International Congress of Tuberculosis in London, that human and bovine tuberculosis were distinct, and that an infection of the human subject with the disease rarely came from the bovine source. Some of the statements made by him at that time may be quoted here.

"Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of an absolute decision to-day or to-morrow, one is, nevertheless, already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence." "I should estimate the extent of the infection by the milk and flesh of tuberculous cattle, and the butter made of their milk,

as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it."

The startling character of his conclusions, which practically amounted to a reversal of his original views, aroused great interest in the subject, and since then many valuable and important investigations have been conducted on the Continent, in America, and in Great Britain. In the latter country one must mention the work of Delépine in Manchester; the researches by Stanley Griffith and Fred Griffith, and by Eastwood, performed for the British Royal Commission, and also independently; and those of Fraser and of Mitchell in Edinburgh.

The results obtained by the various workers have settled many of the disputed points, and definitely proved that Koch's contention of the non-communicability of bovine tuberculosis to man can now no longer be upheld. The inquiry conducted by the British Royal Commission has definitely established—

- (1) That the disease in man, whether caused by the human or the bovine type of the bacillus, is one and the same, in that the clinical histories and the pathological lesions, as produced by the one or the other type, are similar and indistinguishable;
- (2) That man and animals can be reciprocally infected with it; and
- (3) That, although pulmonary phthisis in adults has rarely yielded the bovine bacillus, a certain, but not an unimportant, proportion of the disease manifested in children, more especially that which involved primarily the abdominal organs, could be traced to a bovine origin. Limited by the nature of their inquiry, the subject of the incidence of the disease in children, originated from a bovine source, has not been investigated.

In Edinburgh this question was first taken up by Fraser⁹ in his investigation on a series of unselected cases of surgical tuberculosis of the bones and joints in children, and later by Mitchell²⁰ on cases, also unselected, of surgical tuberculosis of the cervical glands in children. The unusually high percentage of bovine infection found in their cases at once points to the fact that tuberculosis among children in Edinburgh caused by the bovine bacillus, instead of being a negligible quantity, is responsible, unfortunately, for a vast number of cases, at least in so far as these two groups of the disease are concerned.

At the time when I took up a study along a similar line it appeared to me opportune to extend the field of investigation, by going into all tuberculous cases in children that were available to me for examination, irrespective of the previous history of the case, and regardless of the type of infection or presumed mode of origin of such tuberculous lesions as might be present.

The material for the study was obtained from the Royal Hospital for Sick Children and the Royal Infirmary, Edinburgh, and was furnished by post-mortem specimens from a total of twenty cases in children. These cases are reported in detail elsewhere,²⁵ but a brief description is appended in Table I. and summarised in Table II.

TABLE I.

Classification.	Sex.	Age.	Source of Cultures.	Results.
Pulmonary tuberculosis . . .	F.	12	Lung	Human
" " " . . .	M.	1½	Mesenteric glands	"
Abdominal tuberculosis . . .	F.	3½	" "	Bovine
" " " . . .	M.	12	" "	"
" " " . . .	M.	1	" "	"
" " " . . .	M.	8	Spleen	Human
Tuberculous meningitis . . .	F.	5	Mesenteric glands	Bovine
			Bronchial glands	"
			Cervical glands	"
			Meninges	"
" " " . . .	F.	10	Mesenteric glands	"
			Cervical glands	"
			Meninges	"
" " " . . .	F.	4	Mesenteric glands	Human
" " " . . .	F.	4	Lung	"
" " " . . .	M.	14	Mesenteric glands	Bovine
Generalised tuberculosis . . .	M.	4	Tonsil	Human
			Bronchial glands	"
			Lung	"
			Spleen	"
" " " . . .	M.	15	Mesenteric glands	"
			Bronchial glands	"
			Cervical glands	"
			Meninges	"
" " " . . .	F.	13	Lung	Bovine
			Mesenteric glands	"
" " " . . .	F.	3	" "	"
			Meninges	"
" " " . . .	F.	14	Bronchial glands	"
			Mesenteric glands	"
Tuberculous bones and joints .	F.	3½	Tissues from ankle	Human
Caseous gland tuberculosis . .	F.	2½	Mesenteric glands	Bovine
" " " " . . .	M.	1½	" "	"
Latent tuberculosis . . .	M.	3½	" "	Human

TABLE II.

Classification.	Children under 5 Years.		Children 5 to 16 Years.	
	Human.	Bovine.	Human.	Bovine.
Pulmonary tuberculosis	1	...	1	...
Abdominal tuberculosis . . . .	...	2	1	1
Tuberculous meningitis	2	...	...	3
Generalised tuberculosis	1	1	1	2
Tuberculous bones and joints . . .	1	...	...	...
Caseous mesenteric glands . . . .	...	2	...	...
Latent tuberculosis	1	...	...	...
	6	5	3	6

The results show that of the 20 unselected cases in children dying under 16 years of age, 11 were found infected with the bovine tubercle bacilli, or 55 per cent. The results, though limited in scope, also give confirmation to the findings obtained by Fraser and Mitchell, emphasising again the great prevalence of bovine tuberculosis among children in Edinburgh.

Table III. records the results of all the Edinburgh cases so far reported by different workers.

TABLE III.—EDINBURGH STATISTICS.

Authors.	Children under 5 Years.		Children 5 to 16 Years.		Adults 16 Years and over.	
	Human.	Bovine.	Human.	Bovine.	Human.	Bovine.
Fraser ⁹ (bones and joints)	12	35(a)	11	9	3	...
Griffith ¹¹ (cervical glands)	1	1	1	4	...	1
Griffith ¹² (sputum) . . . . .	...	...	...	...	42	1
Mitchell ²⁰ (cervical glands)	3	39	4	26	...	...
Own cases ^{24, 25} (various forms) . . .	6	5	3	6	61	7
	22	80	19	45	106	9

(a) Including 3 mixed strains.

Total cases 281.

Bovine infection at different periods :—

Under 5 years	78·4 per cent.
Between 5 and 16 years	70·3 „
16 years and over	7·8 „

From Table III. it will be seen that, taking into consideration the various clinical forms of tuberculosis that have been investigated, the results, obtained independently by several workers, demonstrate that the infection with the bovine tubercle bacillus is responsible for a large number of tuberculous cases in Edinburgh among children belonging to that class of the populace from which hospital cases are drawn.

In this communication I shall confine myself to dealing with the problem of bovine infection in children, and more particularly as it affects those in Edinburgh. In order to provide a comparison with similar cases examined in England and in other countries, I have prepared the following table from the findings so far recorded by various investigators. The table comprises the works as undermentioned. (The adult cases are also embodied here.)

- In Edinburgh :—
281 cases of various authors (*vide* Table III.).
In England :—
*127 cases of the British Royal Commission.¹
23 sputum cases of Bulloch.³
35 children cases of Stanley Griffith.¹³
105 sputum cases of Stanley Griffith.¹²
54 cervical gland cases of Stanley Griffith.¹¹
109 bones and joints cases of Stanley Griffith.¹⁴
78 children cases of Eastwood and F. Griffith.⁵
261 bones and joints cases of Eastwood and F. Griffith.⁶
17 genito-urinary cases of Eastwood and F. Griffith.⁶
In other countries :—
1350 cases collected by Park and Krumwiede ²² (excluding 11 unclassified mixed strains and also the cases of the British Royal Commission and of Bulloch).

TABLE IV. (A).—CHILDREN UNDER FIVE YEARS OF AGE.

	Edinburgh.		England.		Other Countries.	
	Human.	Bovine.	Human.	Bovine.	Human.	Bovine.
Pulmonary tuberculosis (including sputum)	1	...	10	...	34	1
Abdominal tuberculosis . . . .	...	2	14	16	15	16
Generalised tuberculosis	1	1	14	4(a)	154	17
Tuberculous meningitis	2	...	28	7(a)	25	3
Tuberculous genito-urinary tract . . . .	...	...	...	...	...	...
Tuberculous skin . . . .	...	...	1	...	1	...
Tuberculous adenitis (cervical)	4	40	1	7	16(b)	23
Tuberculous bones and joints	13	35(c)	50(d)	19	26	...
Latent tuberculosis	1	...	2	1	1	...
Other forms . . . .	...	2	...	...	...	...
	22	80	120	54	272	60
Percentage of bovine infection	78.4 per cent.		31.0 per cent.		18.1 per cent.	

(a) Including 1 mixed strain.
(b) Including 2 cases of axillary adenitis.
(c) Including 3 mixed strains.
(d) Including 2 atypical strains.

* One of their cases, H. 34, is omitted, as the age is not given.

TABLE IV. (B).—CHILDREN FIVE TO SIXTEEN YEARS OF AGE.

	Edinburgh.		England.		Other Countries.	
	Human.	Bovine.	Human.	Bovine.	Human.	Bovine.
Pulmonary tuberculosis (including sputum)	1	...	13	...	14	...
Abdominal tuberculosis . . .	1	1	3	4	9	12
Generalised tuberculosis . . .	1	2	16	...	15	1
Tuberculous meningitis . . .	...	3	12	2	1	...
Tuberculous genito-urinary tract	...	...	2	...	2	...
Tuberculous skin . . . . .	...	...	3	6	1	...
Tuberculous adenitis (cervical) .	5	30	18	12	36(a)	20
Tuberculous bones and joints .	11	9	208(b)	49	36	3
Latent tuberculosis . . . . .	...	...	2	2	...	...
Other forms . . . . .	...	...	...	...	...	1
	19	45	277	75	114	37
Percentage of bovine infection .	70·3 per cent.		21·3 per cent.		24·5 per cent.	

(a) Including 4 cases of axillary adenitis.

(b) Including 10 atypical strains.

TABLE IV. (C).—ADULTS SIXTEEN YEARS AND OVER.*

	Edinburgh.		England.		Other Countries.	
	Human	Bovine.	Human.	Bovine.	Human.	Bovine.
Pulmonary tuberculosis (including sputum)	82	2	167	2	716	1
Abdominal tuberculosis . . .	2	2	...	2(a)	22	3
Generalised tuberculosis . . .	5	2	...	...	34	...
Tuberculous meningitis . . .	5	...	...	...	1	...
Tuberculous genito-urinary tract	1	...	15	3	19	1
Tuberculous skin	2	...	7	3	3	...
Tuberculous adenitis (cervical) .	1	1	19	6	39(b)	1
Tuberculous bones and joints .	3	...	54(c)	4	25	...
Latent tuberculosis	2	1(d)	...	...	...	...
Other forms	3	1	...	1	2	...
	106	9	262	21	861	6
Percentage of bovine infection .	7·8 per cent.		7·4 per cent.		0·7 per cent.	

(a) Including 1 intermediate strain.

(b) Including 3 cases of axillary adenitis.

(c) Including 3 atypical strains.

(d) Retroperitoneal glands—macroscopically negative; microscopically and bacteriologically positive.

* These cases are given simply for the sake of completeness.

These figures clearly indicate that here, in Edinburgh, we have a very large percentage of tuberculosis in children whose origin could be traced to an infection with the bovine tubercle bacillus. In children under 5 years of age the incidence of this type of infection, as shown in Table IV., is about $2\frac{1}{2}$ times higher in Edinburgh than in England, and 4 times higher than in other countries; while between 5 and 16 years the ratio is about 3 to 1 as compared with both the latter places. With further investigation these ratios may be altered, but this possibility does not affect the present data, nor does it detract from the general inference drawn from them.

Without entering into discussion of the many experiments which were directed to the question as to whether a tubercle bacillus, while living in the animal body or grown under artificial conditions, could be made to undergo a change of type—from bovine to human or *vice versa*—and disregarding, for a moment, the doubtful results obtained by Eber⁷ and a few others, it may be said that there is an overwhelming majority of workers on this subject whose experiments failed to detect any such transformation. The same may also be stated of the experience of the British Royal Commission² in their work along a similar direction. Hence it may be taken that the identification of the bovine type of tubercle bacillus isolated from the human body would warrant the acceptance that the infection in such a case was derived from a bovine source.

The subject becomes more significant when one recollects the groups of tuberculous affection common in children, and considers the conditions prevailing in Edinburgh that are conducive to the high incidence of bovine tuberculosis in the young subjects. On these two aspects some general statements may be given.

Common Forms of Tuberculosis in Children.—In dealing with this side of the question I shall only take into consideration those forms of tuberculosis which contribute largely to the mortality-rate of the disease as a whole. By this I mean abdominal tuberculosis, tuberculous meningitis, and phthisis.

For the purpose in view I have availed myself of the use of the Statistical Returns for Scotland, published by the Registrar-General for 1915. The ratio of mortality-rate between the three groups of tuberculosis, as expressed by the figures forming Table V., is also found to prevail in former years in much the same feature, and, therefore, it admits of a general application to the question at issue.

TABLE V.—DEATH-RATE OF TUBERCULOSIS PER 100,000 POPULATION IN EACH AGE-GROUP IN SCOTLAND IN 1915.

	All Ages.	Age in Years.										
		0-1.	1-5.	5-10.	10-15.	15-25.	25-35.	35-45.	45-55.	55-65.	65-75.	75-
Phthisis . . .	111	28	26	22	39	131	177	179	158	140	73	29
Tuberculous meningitis . . .	21	227	103	29	13	7	2	2	1	2	...	...
Abdominal tuberculosis . . .	15	102	62	17	14	9	7	4	5	4	1	3
Other forms . . .	17	64	33	14	16	16	13	14	12	14	11	12
Total . . .	164	421	224	82	82	163	199	199	176	160	85	44

This table is clearly illustrated by Diagram I. From these statistics it will be observed that abdominal tuberculosis and tuberculous meningitis both run a course practically diametrically opposite to that of phthisis, in that the former are responsible for the greatest number of deaths in early childhood, whereas the latter at this period of life plays but an insignificant part in the death roll. Further, it is important to note that the mortality-rate of tuberculosis attains its maximum right at the start of life. One may then roughly divide the course of events into three stages—

First Stage.—Beginning at birth and up to the age of 10 years abdominal tuberculosis and tuberculous meningitis together contribute the largest share towards the total deaths from all forms of tuberculosis, while phthisis at this time of life is comparatively rare. This fact is especially evident in the first year of infancy.

Second Stage.—Between 10 and 15 years of age phthisis accounts for practically half of the total fatal cases of tuberculosis.

Third Stage.—From 15 years onwards the mortality-rate of phthisis stands pre-eminently above that of all other forms of tuberculosis, more particularly of abdominal tuberculosis and tuberculous meningitis.

These points are well brought out by Diagram II. In it the relative importance of these groups of fatal tuberculous affections is expressed in a ratio to the summed mortality from tuberculosis at the various age-periods.

If one may approximately gauge the prevalence of an aerial spread of infection by the mortality-rate of phthisis, Diagram II. also affords a general indication that different factors, speaking in a broad sense of the word, are in operation in the infection in

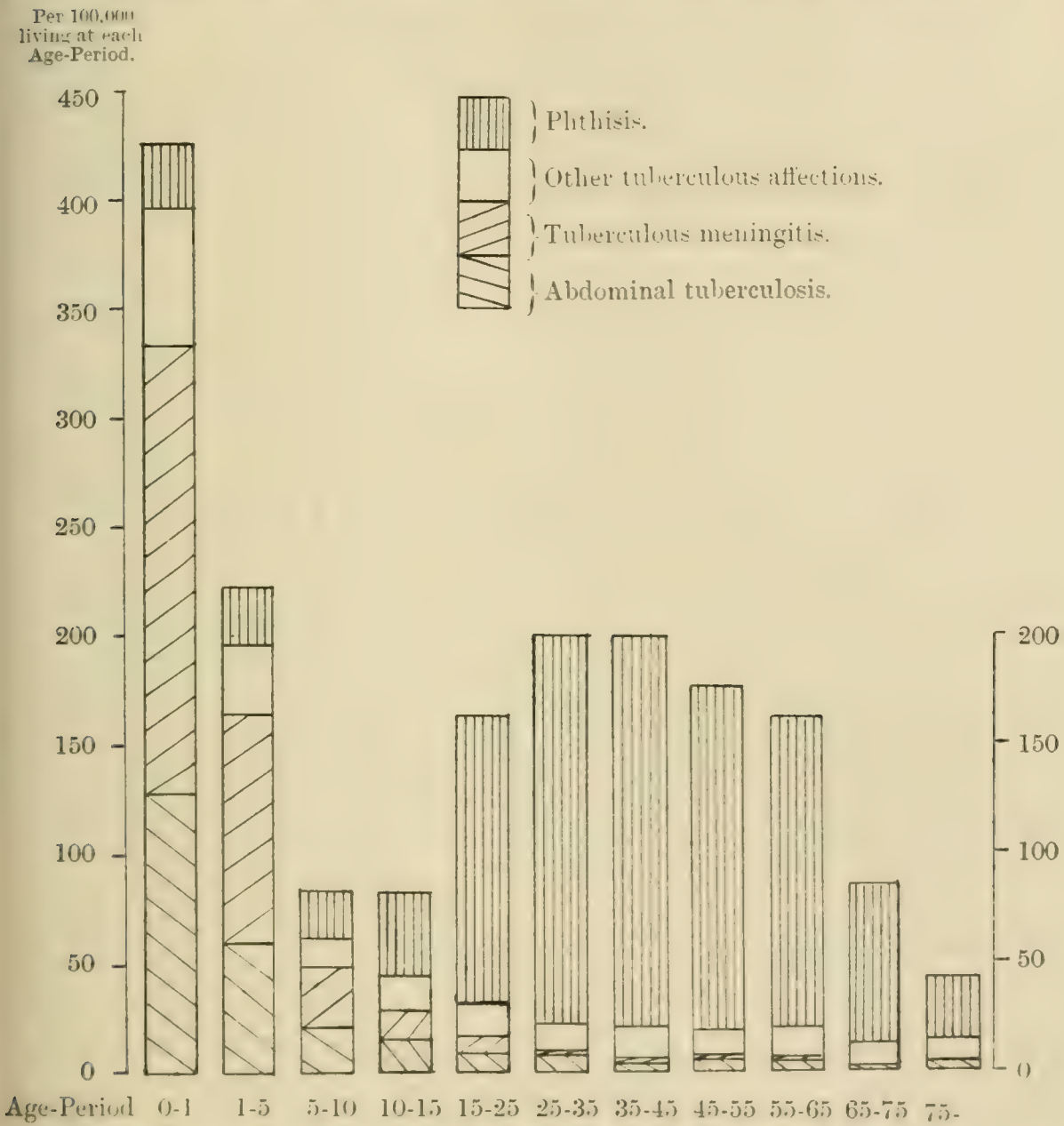


DIAGRAM I.—Death-Rate of Tuberculosis per 100,000 Population at each Age-Period in Scotland in 1915.

abdominal tuberculosis and tuberculous meningitis on the one hand, and in phthisis on the other hand, and further gives emphasis to the important *role* played by the alimentary canal in the causation of the former groups of the disease.

My own work (*vide* Tables I. and II.) gives the result that

among the 20 unselected cases in children investigated, bovine tubercle bacilli were isolated from 3 out of 4 cases of abdominal tuberculosis; from 3 out of 5 cases of tuberculous meningitis; from

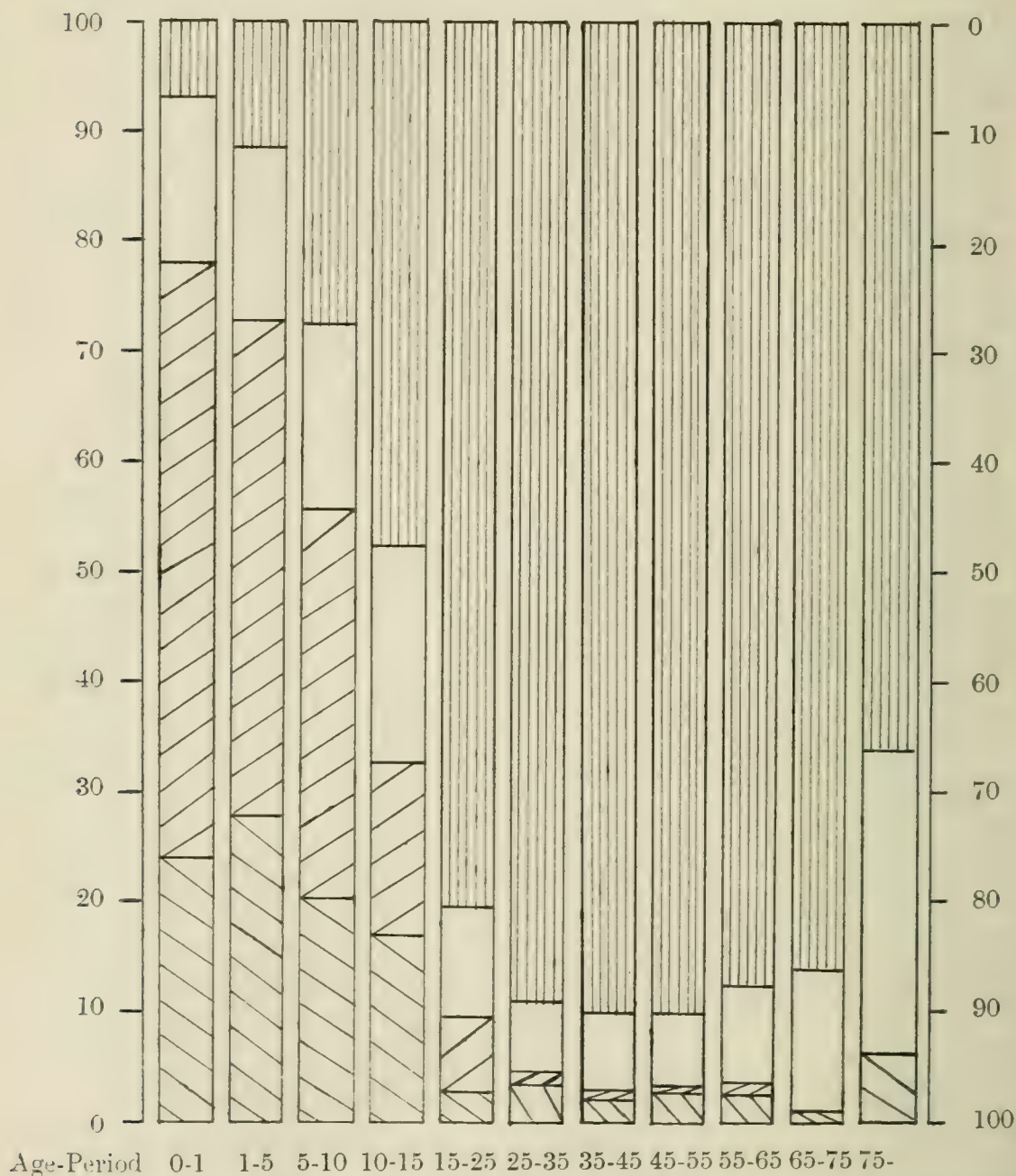


DIAGRAM II.—Ratio of the Death-Rate of Phthisis, Abdominal Tuberculosis, and Tuberculous Meningitis to the Total Mortality-Rate of Tuberculosis at the various Age-Periods.

3 out of 5 cases of generalised tuberculosis; and also from the mesenteric glands of two further cases showing no signs of tuberculosis during life. It may be noted here that of these 11 bovine infected cases, 9 showed primary lesions in the abdomen,

as judged by the post-mortem evidence. The cases worked upon are not very large, but this drawback does not vitiate the general conclusion to be drawn from the figures, that tuberculosis originated from the bovine source constitutes an important cause of many deaths among children.

Knowing as we now do that tuberculosis in the human subject may be produced by the bacillus of either the human or the bovine type, and leaving aside here the very rare cases originated from an infection with the avian type, it may be broadly indicated that the portal of entry into the body taken by the human bacilli is the respiratory tract, giving rise to phthisis in the majority of instances, while the bacillus of the bovine type is introduced through the alimentary canal. This general statement does not, of course, deny the possibility that, in a few cases, pulmonary phthisis may be caused by an infection from the alimentary canal, nor the possibility that bovine infection may be conveyed by the air.

Thus it has been shown that in many cases of abdominal tuberculosis and tuberculous meningitis, which are diseases peculiar to childhood, the causal element is the bovine tubercle bacillus, and that such a type of bacillus most commonly effects an entrance into the body through the alimentary tract. This leads us then to consider the question of infant feeding.

Infant Feeding.—Two determining factors are at work in the production of bovine tuberculosis in children. Firstly, that the cow's milk must have been infected with living tubercle bacilli; and, secondly, that the feeding of the child must have consisted of, or have been supplemented by, tuberculous milk, which was consumed raw. The incidence of bovine infection in a locality will, therefore, depend, generally speaking, on the extent these two conditions prevail in that place. I shall treat of these two points by citing some facts as found in Edinburgh.

Mitchell²¹ has examined 201 samples of mixed milk collected from different parts of the town, and found 41 samples (20 per cent.) infected with tubercle bacilli. The same aspect of the subject was, independently, taken up by Miller,¹⁹ who showed that 13 out of 101 specimens of milk contained living tubercle bacilli. Averaging their results, this gives for Edinburgh a 17·8 per cent. of tuberculous cow's milk.

For comparison, in this respect, with other large towns the following table is appended:—

TABLE VI.

	1908.	1909.	1910.	1914.
	Per cent.	Per cent.	Per cent.	Per cent.
Edinburgh . . .	...	...	...	17.8
Birmingham . . .	11.3	7.5	7.3	...
Liverpool . . .	3.3	1.8	4.1	...
London . . .	...	...	9.6	...
Manchester . . .	8.7	5.5	6.0	...
Sheffield . . .	9.9	10.9	10.4	...

The finding of a large percentage of tuberculous infected milk in Edinburgh will only explain, in part, the high incidence of bovine cases among children there, for the next point then arises with regard to the prevalence in practice of consumption of unboiled milk among the infant populace.

Through the courtesy of Dr. John Thomson I have been able to examine the records of all the cases which were admitted to his ward at the Royal Hospital for Sick Children, Edinburgh, during the second half of 1915 and the early part of 1916. Every fresh inmate to that ward was submitted to the von Pirquet test, and this was done by Dr. Bronson, then resident physician there. My examination was chiefly directed to the result of the tuberculin reaction and to the history of dieting. The cases under review, amounting in all to 359, were, therefore, consecutive in order and free from any trace of selection.

In 228 of the 359 children, or 63.5 per cent., a definite history of consumption of cow's milk at infancy was recorded. This percentage figure would no doubt be higher, were it not for the fact that many cases with no clear entry regarding the milk diet had to be excluded from consideration. Of the 228 cases, 102 (45 per cent.) gave a precise history of consumption of raw milk; 31 (14 per cent.) of milk that was previously boiled; and 95 (41 per cent.) of milk, the condition of which not being stated I have prepared the following table (Table VII.) of these cases, showing the percentages of children giving a positive tuberculin reaction where the milk was taken (1) raw; (2) after being boiled; (3) indifferently, that is, in a state not specified; and (4) where the milk diet was not inquired into. To avoid introducing errors in the interpretation of the result, 35 cases having a family history of tuberculosis are excluded from the first 3 series of cases, but are embodied in the fourth.

TABLE VII.

Age in Years.	(1) Milk unboiled.		(2) Milk boiled.		(3) Milk indifferent.		(4) Milk diet not inquired into.	
	Total.	Pirquet. +	Total.	Pirquet. +	Total.	Pirquet. +	Total.	Pirquet. +
0-1	10	2	6	0	31	1	23	1
1-2	19	8	8	1	20	4	33	6
2-3	16	7	2	0	9	2	17	4
3-4	6	2	1	0	9	1	19	6
4-5	2	1	2	1	2	2	11	3
5-6	9	5	0	0	1	0	14	3
6-7	4	3	1	0	1	1	7	2
7-8	4	1	3	1	5	2	9	3
8-9	4	1	2	1	3	2	11	3
9-10	2	0	0	0	2	1	8	3
10-11	4	0	0	0	1	1	6	2
11-12	0	0	1	0	3	1	8	1
	80	30	26	4	87	18	166	37
Per cent.) positive)	37.5		15.4		20.7		22.3	

The table then shows that the diet in a substantial majority of children belonging to the working class consisted partly or wholly of cow's milk, and that only in a small percentage of instances was the milk boiled before being consumed. Another important point to be noticed is that a higher percentage of children who were fed on raw milk gave the tuberculin reaction than in the case of those where boiled milk was only given, the ratio being 5 to 2.

Accepting as a fact that the von Pirquet reaction is specific, let us then assume that the 4 positive cases, out of the series of 26 giving a history of consumption of boiled cow's milk (*i.e.* 15.4 per cent.), were not infected with the bovine but with the human tubercle bacilli. Similarly, we must also grant that the same percentage of the human source of infection was to be found in the cases where unboiled milk was used in the feeding. Hence, 15.4 per cent. (presumed, as above indicated, to be of human origin) of the total number of 106 children (80 plus 26) under these two categories will yield 16 cases, which would, according to this assumption, have derived their infection from

the human source. Making this allowance, there remain, therefore, 18 cases which would owe their infection to a bovine source, in this instance associated with the consumption of tuberculous milk. Thus 18 cases were of bovine and 16 of human infection, giving a percentage of 53 and 47 respectively. That these deductions are within the mark is justified by the bacteriological findings, as above recorded.

The prevalence of abdominal tuberculosis among children in Edinburgh is undoubtedly dependent on the high percentage of tuberculous cow's milk and the large proportion of bottle-fed babies; to present this point clearly I have selected, for comparison, six important centres of population, as shown in Table VIII.

TABLE VIII.

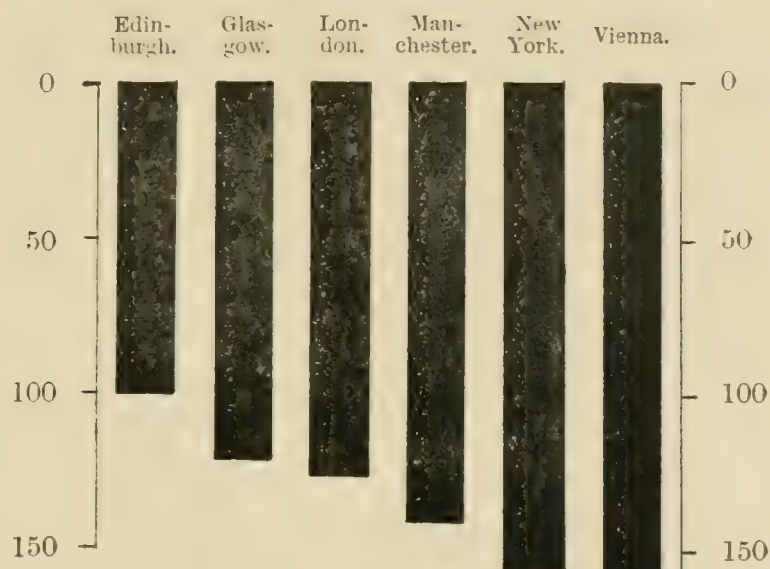
	Death-Rate of Phthisis per 100,000 living in 1912.		Percentage of Abdominal Tuberculosis in Children admitted to Hospitals. ⁸			
	Death- Rate.	Ratio.	Ratio.	Per cent.		
Edinburgh	108	100	100	3.6 averaged on 15,320 cases.		
Glasgow	131	121	128	4.6	"	8,619 "
London	135	125	50	1.8	"	22,896 "
Manchester	153	141	55	2.0	"	15,795 "
New York	170	157	12	0.42	"	3,082 "
Vienna	237	220	13	0.46	"	11,184 "

Expressing in ratio to Edinburgh the relative prevalence of these two diseases in the other towns is indicated in Diagram III.

These figures show that while in Edinburgh the death-rate of phthisis is the lowest as compared with the other towns mentioned, thanks to the inauguration of a tuberculosis dispensary and better sanitation of dwellings, yet the number of cases of abdominal tuberculosis is the highest but one in the list, this despite the influence of the sanitary improvements and anti-tuberculosis campaign. Glasgow, which may be looked upon as similar to Edinburgh in essential respects as regards the mode of infant feeding and general hygienic environment, affords another instance of a very high incidence of abdominal tuberculosis with a comparatively low mortality of phthisis. Taking the conditions in the English towns, as London and Manchester, for comparison, one finds that, corresponding with a lower percentage of tuberculous cow's milk,

there is also a lesser proportion of abdominal tuberculous cases among children. In marked contrast to what is outlined in these examples is the aspect of affairs in Vienna; there, cow's milk is very seldom consumed raw, and one at once observes that

Ratio between the Death-Rate of Phthisis in Edinburgh and in other Towns (1912).



Ratio between the Incidence of Abdominal Tuberculosis among children in Edinburgh and in other Towns, as based on Hospital Statistics.

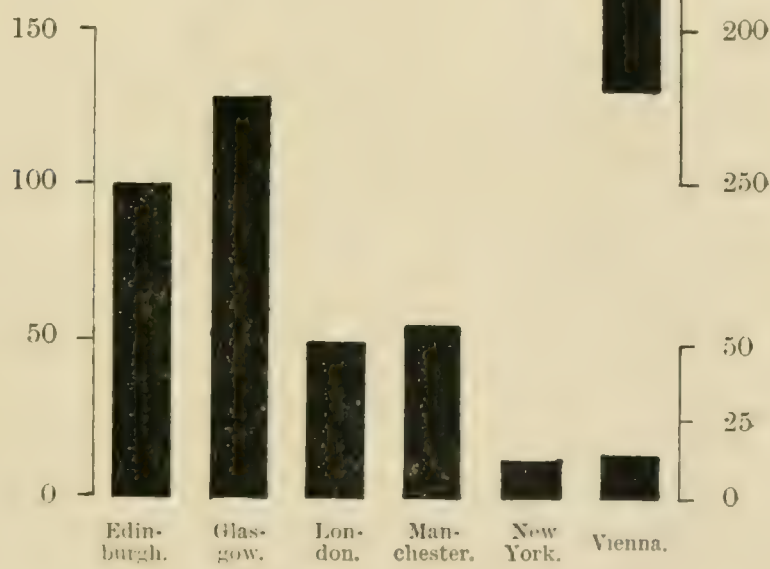


DIAGRAM III.

abdominal tuberculosis is but a rare occurrence, notwithstanding the fact that the death-rate of phthisis in that town is more than twice that in Edinburgh.

As supporting the same contention further evidence is forthcoming from the post-mortem statistics of children cases in Edinburgh and in Vienna. These are given in Table IX.

TABLE IX.¹⁸

	Edinburgh (Shennan).		Vienna (v. Ghon).	
	243		175	
	Cases affected.	Per cent.	Cases affected.	Per cent.
Total cases				
Mediastinal glands	93	39	113	67
Mediastinal and mesenteric glands . .	101	42	169	100
Mediastinal glands, total	194	81	169	100
Mesenteric glands alone	45	19	...	...
Mesenteric glands, total	150	63	56	33

This table shows the great frequency of involvement of the abdominal glands in tuberculosis in Edinburgh, and, indirectly, is confirmatory of the important factor of tuberculous cow's milk in the production of this clinical type of the disease in children.

Summary.—From the foregoing it is possible to summarise a few salient facts.

1. A bacteriological investigation into 281 cases of various clinical forms of tuberculosis in Edinburgh conducted by various workers has resulted in the isolation of the bovine tubercle bacilli in 80 out of 102 cases (78·4 per cent.) under the age of 5 years; in 45 out of 64 cases (70·3 per cent.) between 5 and 16 years; and in 9 out of 115 cases (7·8 per cent.) above 16 years. These percentages of bovine tuberculosis are considerably higher than those obtained in England and in other countries.

2. The most common fatal affections of tuberculosis in childhood, and especially in early infancy, are abdominal tuberculosis and tuberculous meningitis, and they together are responsible for about 90 per cent. of the summed mortality from tuberculosis in children under 1 year, and about 75 per cent. in children between 1 and 5 years. The material from 9 children dead from these two diseases was examined bacteriologically, and from 6 the bovine type of tubercle bacillus was isolated.

3. A large percentage of children in Edinburgh is fed wholly or partly on cow's milk, and in a great number of instances the milk is consumed raw. These two incidents, together with the high percentage of tuberculous cow's milk, give an explanation of the prevalence of abdominal tuberculosis in Edinburgh, and, further, would account for the infection in the 6 cases of abdominal

tuberculosis and tuberculous meningitis from which bovine tubercle bacilli were obtained.

4. Children who were bottle-fed on raw cow's milk and also those fed on boiled cow's milk were tested with tuberculin; it was found that 37·5 per cent. of the first group of cases reacted, as against 15·4 per cent. of the second group. If the reaction be accepted as an indication of the presence of an infection in the body, the result, in a measure, affords corroboration to the bacteriological findings.

5. Having regard to the fact that in early childhood abdominal tuberculosis and tuberculous meningitis conjointly contribute the greatest share towards the total deaths from tuberculosis, and in view of the prevalence of bovine tuberculosis among the young subjects in Edinburgh, it follows that the very high incidence of infection from the bovine source identified there involves a problem of real significance and one which calls for close attention. From a prophylactic standpoint of view, any measure resorted to in combating the disease should, therefore, be directed not only against the human spread of infection, but also, and more particularly in the case of children, against the bovine source of infection.

6. Failing an adequate supervision of the milk supply, the most efficient way of safeguarding against the bovine type of tuberculosis is to subject all cow's milk for consumption to the process of sterilisation by boiling.

7. Lastly, it must be mentioned that the material submitted to the investigation was available from children of the poorer class, and the results arrived at should, therefore, not be considered as strictly applicable to the community in general, nor must they be taken to represent the conditions prevailing in other localities where the environment might be widely different.

I have much pleasure in thanking Professor James Ritchie for much valuable advice and suggestion in connection with my investigation, and Dr. John Thomson for kindness in permitting me to examine the records of his cases and in other directions.

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ON THE PATHOLOGY OF SO-CALLED SPRAINS OF THE ANKLE, WITH AN ILLUSTRATIVE CASE.

By EDGAR F. CYRIAX, M.D.(Lond.).

THE pathology of sprains of the tarsus, uncomplicated by fracture, is usually taken as being over-extension, with partial or complete rupture, of ligamentous structures in the area of the sprain. A fact which, in my opinion, has not received due consideration is that in many of these cases of "sprained ankle" the condition is complicated by the setting up of minor osseous displacements, commonly called subluxations, and that every time these occur there must also arise cartilaginous displacements either as regards one or both bones between which such cartilages lie. Another fact which I cannot remember having seen mentioned is the clinical one—that cartilaginous displacements may take place *per se* without any disturbances in the position of the adjacent bones, just as in the case of the cartilages of the knee-joint.

These pure cartilaginous displacements are unfortunately outside the domain of proof by X-rays; clinically they are sometimes easily demonstrable. I recall one case under my care some years ago of an old sprain which had never properly healed, where there was difficulty in walking, attended by pain over the instep. The only abnormality, apart from some swelling, was a displacement upwards of the cartilage between the astragalus and the scaphoid, so that it projected about $\frac{1}{8}$ inch above the joint between the two bones. Reposition was quite easy; the foot was manipulated to render it supple; traction of the distal part of the foot away from the ankle, combined with eversion, was applied

in order to open up the astragalo-scapoid joint; gentle pressure, combined with vibration, was then administered to the cartilage, which slipped back into its proper position. The result was immediate and permanent relief of the symptoms.

I have emphasised the importance of such displacements of cartilages, because, in my opinion, they are frequently the cause of delayed healing, and continually recurring attacks of pain, swelling, etc., that are found in certain sprains of the foot. It is obvious that unless such displacements are rectified, a permanent and radical cure will be very difficult, if not, indeed, impossible.

The diagnosis of such osseous and cartilaginous subluxations is frequently a matter of some difficulty, especially if they are slight. Generally speaking, they present, only to a minor degree, the symptoms of similar dislocations elsewhere. Certain other symptoms which one rarely, if ever, sees mentioned are—

(a) Attempts to move the bones so as to increase the amount of subluxation suspected, increase any pain or discomfort that may be present; attempts to move them in the opposite direction tend to diminish it.

(b) Exercising pressure or traction so as to open out the joint or joints in which the subluxations are suspected generally alleviates any pain or discomfort that may be present, whereas movements to compress the joint generally increase it.

(c) Performing movements of flexion, extension, rotation, etc., at a joint or joints where subluxations are suspected, causes abnormal grating sounds which are similar to those found with cartilaginous displacements elsewhere; they are quite distinct from, though may be combined with, grating sounds due to synovial thickenings, etc.

(d) Sudden locking of the joints, with acute pain and total inability to use them, is strongly suggestive of subluxations.

The use of X-rays is in many cases desirable, in others a *sine qua non*, and views should be taken of both feet, as it is frequently only by comparison of the two feet that an accurate estimate of abnormalities may be made.

I have during the course of years had a number of "sprains" of the ankle sent to me, because, in spite of prolonged treatment, the symptoms did not entirely abate or frequently recurred. In the great majority of these cases I have found osseo-cartilaginous or pure cartilaginous subluxations, the rectification of which caused permanent benefit. I venture to suggest that were all cases of "sprained ankle" carefully examined for subluxations,

and if such were identified, treated accordingly, the results would be far more satisfactory, and the fame of "bone-setters," into whose hands these cases often gravitate, would diminish, if not disappear.

As an illustration I append the notes of a case; I have specially selected it because of the X-ray findings.

Mr. X., aged 52, consulted me on 14th December 1914.

History.—On 14th June 1912 the patient slipped on a greasy road and fractured his left patella. Operation became necessary, and the patella was wired. The left leg showed a good deal of discoloration, and the left large toe was very painful, the nail turning black; oedema of the entire lower leg supervened. It was not until nearly two months later, when the patient first attempted to stand, that it was noticed that the left ankle was abnormal; its outer side was swollen and oedematous, and much pain was induced in the ankle on attempting to use it; the muscles of the ankle joint were very weak. In spite of massage and careful attempts to get the foot accustomed to exercise, the symptoms showed very little sign of improvement during the ensuing six months, and about September 1912 a skiagram was taken of the left foot only, *i.e.* no comparison between the two feet was made. The foot was pronounced to have no displacement but some degree of flatness, and instep supports were recommended, which resulted in some improvement. Between December 1912 and December 1914 the condition of the foot remained practically stationary. There was a certain amount of stiffness and swelling always present; walking during the earlier part of the day was quite comfortable at times, though not always, but as the day wore on, generally became quite painful, especially after resting for a short interval. During these two years massage had been fairly regularly employed, but only from the point of view of flat-foot and ligamentous sprain, not displacement.

Examination.—The patient walked with a limp, and preferred using a stick when so doing, and stated that the free use of the foot was impeded by what he termed "bony obstruction." He complained of pain in the foot generally, and specially in the outer ankle, which area was seen to be swollen and pitted on pressure, such pressure increasing the pain. Sudden pressure below the os calcis in an upward direction caused acute pain "somewhere right inside the foot." Inversion, flexion, and extension caused no pain and showed no limitation of range. Eversion caused considerable pain and showed great limitation of range, this being

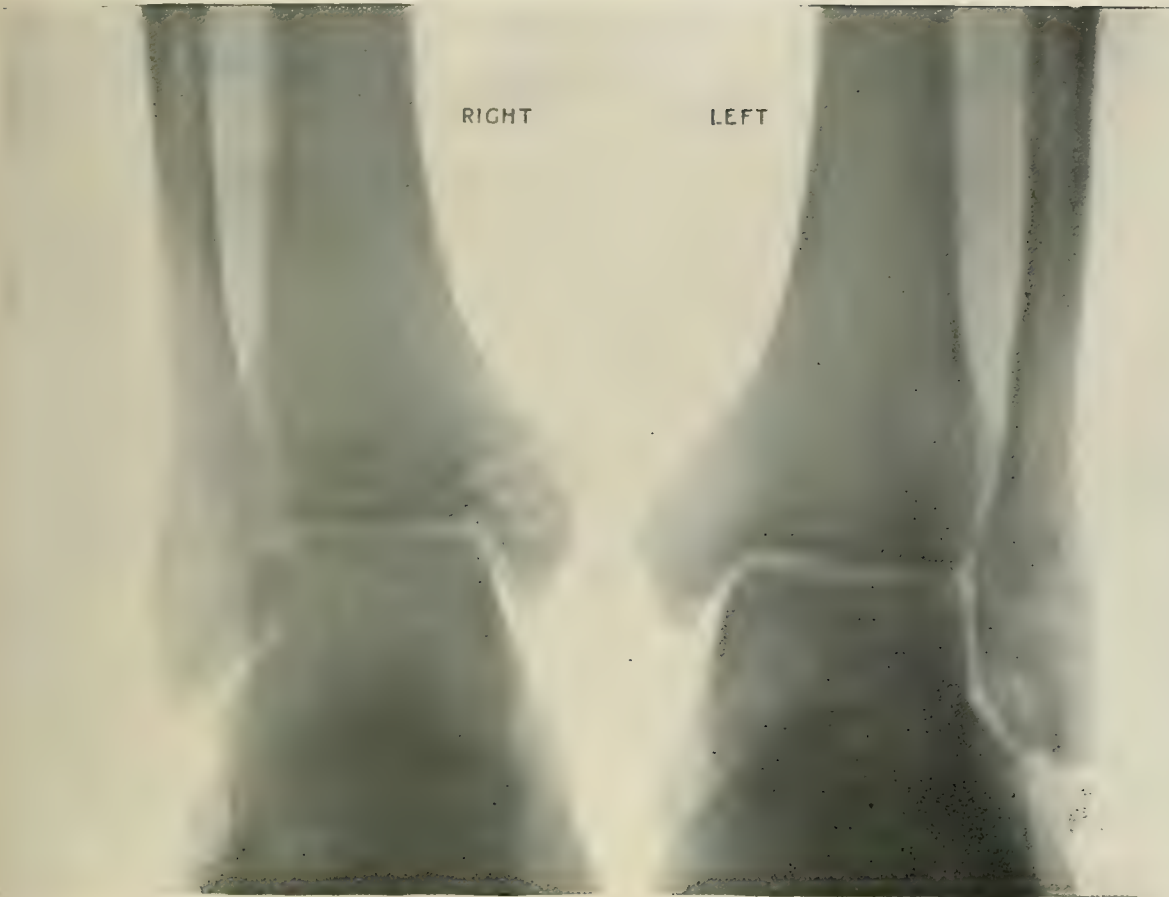


FIG. 1.



FIG. 2.

chiefly due to what appeared to be bony obstruction. Circumduction was limited in its eversion phase, and during its execution coarse grating sounds, both cartilaginous and synovitic, were plainly heard and felt. The lower leg having been fixed with one hand and the foot grasped with the other, attempts to move it laterally inwards * *en masse* also elicited these sounds, but relieved the pain. Moving it laterally outwards *en masse* also induced these sounds, but aggravated the pain.

On comparing the two feet the left internal malleolus was seen to project further over the inner border of the foot and the left external malleolus less over its outer border than in the right foot, so that the left foot as a whole lay about $\frac{1}{4}$ inch further to the outer side of the middle line than the right one. As regards the muscular actions, there was considerable weakness of the inversor and eversor group, the flexors and extensors being quite good.

A skiagram (see Fig. 1) was taken of both feet on 14th December by Dr. Stanley Melville, whose report is as follows:—"The ankle-joint is apparently normal in outline. With both feet placed side by side and supported by sand-bags the right foot appears to be normal. The left foot shows a marked prominence to the outer side, namely, the shadow of the os calcis. The appearance strongly suggests a subluxation of the tarsus below the astragalus."

Treatment.—The first two visits were expended in producing relaxation of the parts; this was done by means of vibrations, pétrissage, and fairly gentle passive movements of the tarsal joints. At the end of the second visit attempts at reposition were made. The tibia and fibula were firmly fixed with one hand, and the other hand grasped the foot and depressed it *en masse* while at the same time everting it. By this means the joint between the astragalus and the os calcis was opened up. The foot was then gently moved from side to side, pressure being applied each time this was done in an inwards direction. The result was that the os calcis moved into its correct position without the slightest pain. The immediate effect of this reposition was the disappearance of all differences between the two feet, and, generally speaking, of all the objective signs of the subluxation. From the subjective point of view, there was an immediate great diminution of pain and discomfort on walking, and the bony obstruction

* It is a fact not sufficiently appreciated that a good deal of lateral movement is obtainable passively in the calcaneo-astragaloid joint.

referred to above was no longer experienced. The after-treatment consisted of pétrissage, active and resisted exercises, etc., in the usual way, which caused still further improvement in the symptoms. On 24th March 1915 a second skiagram (see Fig. 2) was taken by Dr. Melville, whose report was: "The outline of the bones of the left foot is now normal."

During November 1916, in reply to a letter of mine, the patient informs me: "I am pleased to give you a very good account of the foot and leg generally. I am getting no pain or inconvenience in walking."

NOTES ON ACUTE INTESTINAL OBSTRUCTION.

By ALEXANDER MILES,
Surgeon, Royal Infirmary, Edinburgh.

II.—OBSTRUCTION THROUGH ABDOMINAL APERTURES.

STRANGULATION of the bowel by the margins of an aperture in one or other of the mesenteric processes of the peritoneum is comparatively rare. On looking through my notes I can only find records of four such cases on which I have operated. Three of the patients were males, aged respectively 25, 35, and 71, and one was a female, aged 55. All were fatal. The operations were performed 16 hours, 2½ days, 4 days, and 5 days after the onset of symptoms.

There is nothing in the clinical features of such cases to differentiate them from obstruction by bands.* There is the same sudden onset of acute abdominal pain, attended with vomiting and the general signs of peritonism; the same variation in the rapidity of progress of the symptoms; and the same absence of characteristic physical signs on examination of the abdomen.

In all my four cases the illness came on with startling suddenness, and, except in one, without any warning or previous abdominal discomfort. One man, aged 35, who had always enjoyed perfect health, while on holiday in the country was suddenly seized with pain about ten o'clock at night; by two next day he was moribund, and died a few hours after the obstruction was relieved by operation. In the other three cases, although the onset was equally acute, the symptoms varied in severity during several

* *Journal*, October 1916, p. 241.

days, and in two of them the bowels moved on the second day with so much relief that operation was postponed until the symptoms recurred, the delay in operating doubtless contributing to the fatal results.

In accordance with the general experience in this form of obstruction, the pain in all these four cases was most marked in the lower part of the abdomen, and the area below the umbilicus was most tender on pressure. In two the pain and tenderness were so definitely localised to the right iliac fossa, and the muscles in this region were so much more tense than on the opposite side, that appendicitis was diagnosed. Dulness in the right iliac fossa and flank was an additional misleading symptom in these cases. In another more advanced case there was dulness in both flanks, due doubtless to free fluid in the peritoneum. In none of the cases did rectal or vaginal examination yield any positive information. In one case only was blood passed per rectum.

The prominence of the signs in the right iliac region was in consonance with the pathological findings, for in all the cases the aperture was situated in the mesentery of the lower ileum, and it was the last few feet of small intestine that were implicated. This agrees with general experience, and Treves points out that in this region there is "a particular spot in the mesentery of the fœtus marked by an area of peritoneum which is entirely devoid of fat, of glands, and of blood-vessels," where an abnormal aperture is liable to develop from one cause or another later in life. Whether or not this was the explanation of the defects in the mesentery in the present series of cases can only be conjectured; in any case there was nothing in the previous history of any of the patients otherwise to account for them; there had been no previous abdominal operation, and no history of injury was forthcoming.

In two of the cases the incision was made in the right iliac fossa, through the outer edge of the sheath of the rectus muscle; in the other two it was made in the middle line below the umbilicus. In three cases the lesion was readily found and dealt with; in the fourth it was discovered on post-mortem examination. The extent of bowel implicated varied from six inches to several feet, and the severity and acuteness of the illness was roughly proportionate to the amount of bowel that had become strangulated. The most severe case, for example, was that of a man aged 35 in whom five or six feet of the ileum had passed through the opening and become twisted on its mesentery, forming a volvulus. He died a few hours after the operation, which was performed within

16 hours of the onset of symptoms. It was interesting that in this case the bowel was not tightly constricted by the margins of the aperture, but the strangulation was due to the twisting of the mesentery some inches beyond the hole. The extreme acuteness of this case is in accordance with what usually happens in cases of volvulus. In two of the cases which ran a less acute course only a few inches of bowel had passed through the aperture, but the bowel was tightly grasped. In one case operated upon on the fifth day of the illness, the bowel was so friable that it gave way when handled; the gangrenous segment was resected, but the condition of the patient did not permit of an anastomosis being established, and a Paul's tube was inserted into each end of the bowel; she died a few hours after operation. Only in one case, a man aged 71, operated on on the fourth day of his illness, were the margins of the ring firm and thickened, and curiously enough the constriction was less tight in this case than in any of the others. This patient gave a history that for two years previous to the onset of his acute symptoms he had frequently been troubled with a griping pain in the belly, "as if wind gathered," and he stated that if he made firm pressure over the part he recognised a gurgling and obtained relief. It seems possible that these attacks may have been due to a partial prolapse of bowel which the pressure reduced.

CLINICAL RECORDS.

A CASE OF VIOLENT SCREAMING AND PHOTO-PHOBIA CAUSED BY DENTITION.

By JOHN THOMSON, M.D.

WE are all now agreed that our forefathers erred in attributing the causation of much serious disease, and even death, to the physiological process of teething. It is apt to be forgotten, however, that teething does occasionally produce very striking and alarming nervous symptoms, such as giddiness, head-retraction, vomiting, photophobia, and violent screaming. Perhaps, therefore, the following notes of the most severe case of the kind I have ever seen may not be without interest.

In 1893 I had the opportunity of watching, along with Dr. Simson C. Fowler, a breast-fed but slightly rickety baby, who, between the ages of $9\frac{1}{2}$ and 20 months, suffered from severe nervous symptoms, which seemed always associated with the cutting of teeth. The first attack began when the lower central incisors were appearing (æ. $9\frac{1}{2}$ months), and continued, with only slight intermissions, for 11 weeks, by the end of which time ten teeth had appeared. The attack then ceased quite suddenly. Its main features were photophobia and loud screaming; the child also vomited once.

The *photophobia* was very pronounced—like that seen in cases of corneal ulcer—and the child held down his head, and could only be induced to open his eyes very slightly in the dark. On the day on which it began (in the end of February) the sun was bright and the ground was covered with snow, which may possibly have had something to do with the onset of the symptom. The eyes were examined several times by Sir George A. Berry, and found normal in every respect. The instillation of a few drops of a 5 per cent. solution of cocain greatly lessened the photophobia, but only for a few minutes. No other treatment that was tried had any effect. One morning in the beginning of May, when his mother took him out as usual, the child opened his eyes widely and looked about him. There was no return of the photophobia for 3 months.

The *screaming* was very violent—Dr. Fowler said he had heard it on the street fully 200 yards from the house. It was said to

go on almost constantly as long as the baby was awake, and it was especially bad during the night. No cause for it could be found. It naturally caused much distress to the parents, not only because the child seemed to be suffering, but because of the extent to which its screams disturbed the neighbours. Antipyrin, in doses of grs. iii. every 6 hours, gave a little relief for a short time; chloral had no effect. Finally, laudanum was given, and, as it lessened the screaming, the parents continued it, and steadily increased the dose. For 6 weeks he had from 10 to 20 drops, and after that for about 4 weeks as much as $18\frac{1}{2}$ drops, every night at bedtime. This effectually quieted him, but did not make him sleep much. In the beginning of May the screaming ceased suddenly along with the photophobia, and the laudanum was at once discontinued without any difficulty. For 3 months after this the child seemed quite well. Then, in the beginning of August, his symptoms suddenly returned. His parents were at the time on a visit in Glasgow, and they had to come home hurriedly on account of the screaming. This time, along with the screaming, there was constant vomiting and numerous green motions. There was also considerable photophobia, and the child held his hands in front of his eyes; it was not so bad, however, as on the former occasion. The four canine teeth were found to be bulging the gums. Five weeks later these teeth were all through, and the symptoms ceased abruptly.

In the beginning of December, when the child was 20 months old, he had an attack of influenza, with bronchitis; and, when recovering from this, he suddenly took severe diarrhoea and vomiting. This was immediately followed by a degree of photophobia, rather less severe than before, and by screaming just the same as formerly. The lower back molars were found to be coming. The symptoms continued for some weeks and then ceased, and nothing of the kind occurred again.

All the attacks occurred when a set of teeth was in process of appearing through the gum. Lancing the gums was not tried, because on no occasion was there any redness, swelling, or tenderness over the coming teeth, so that there seemed no indication for it. Indeed, the child's mother remarked that he never wet his bib or put his fingers into his mouth as her other children had done when their teeth were coming. I may mention that a vigorous attempt was made to remedy the unnatural lack of saliva by having the gums rubbed with tincture of pyrethrum, but it had no effect on the symptoms. The important point in

the treatment was the excellent result of the very large doses of laudanum which were given, and the absence of bad results from them or of any difficulty in stopping the drug. In more than one similar, though less severe, case I have found this line of treatment successful.

The boy grew up an ordinarily healthy and not particularly nervous lad of normal intelligence, and his medical history during boyhood was entirely uneventful. When 18 years old he developed severe pulmonary tuberculosis, of which he died a year later.

TWO CASES OF CONGENITAL SYMMETRICAL PERFORATION OF THE PARIETAL BONES.

By DAVID M. GREIG, C.M., F.R.C.S.(Edin.),
Senior Surgeon, Dundee Royal Infirmary.

To the only case hitherto described during life of congenital symmetrical perforation of the parietal bones, which I published in the *Journal of Anatomy and Physiology* in 1892, I desire to add a second case of this rare affection, and to publish for the first time a radiogram showing the condition in the living subject. As my first case has considerable bearing on my second, I offer no apology for briefly recapitulating it.

In 1889 Robert Ross, aged 25 years, a driver in the Royal Field Artillery, came under my observation in India. Being in trouble for some slight dereliction of duty he excused himself on the ground that, as the result of a fall from his horse some years previously, he had "soft spots on his head" which rendered him unable to stand the heat of the sun in a tropical climate. On his admission to hospital I found that he presented a symmetrical deficiency at the postero-superior angle of each parietal bone, the two openings being separated by a median bridge presumably corresponding to the sagittal suture. In due course he came before an Invaliding Board, and was transferred to England and invalided from the Army. He had informed me that he belonged to Aberdeen, and as I was about to relinquish my commission I asked Ross to come and see me if ever he should be in Dundee, which promise he fulfilled in 1891. He then told me that the condition was a congenital one, and that it gave him no trouble whatever, either on exposure to the sun or during exercise. I was enabled to complete my observations on his condition, and then published his case.¹ Thereafter I lost sight of him until the

end of 1898, when he returned to me with an ununited fracture of the left humerus. He stated that three years after leaving the Royal Artillery he had enlisted in the Seaforth Highlanders, and had served at home and abroad, had seen active service on the Frontier of India, and that the injury to his humerus was the result of a fall over the parapet of the fortifications at Malta. On 18th January 1899 I exhibited this patient at the meeting of the Edinburgh Medico-Chirurgical Society, not in connection with the injury to the humerus, but that I might demonstrate to the members the congenital symmetrical perforation of the parietals of which he was the subject.² Shortly after that he again disappeared, and I did not see him again; but I have now learnt that, on the outbreak of the present war, he re-enlisted in an infantry regiment, and though some exception was taken to the condition of his left humerus he maintained, what was not true, that he was naturally left-handed, and that he supported the rifle with the right hand and pulled the trigger with the left. This explanation met with approval, and he went out to France, where he went through the present campaign until he was killed at Neuve Chapelle.

Early in December 1916, while at work in the Out-Patient Department of the Dundee Royal Infirmary, a man named Donald MacDonald, stating that he was a discharged sergeant of the King's Own Scottish Borderers, presented himself for treatment of an acute abscess on the scalp. I was at once struck by the extraordinary similarity in this man's manner and appearance with that of my previous patient Ross, so much so that I addressed him by the name of Ross. He gave an interesting history. He had enlisted as a lad in the Gordon Highlanders, where he had been a piper and risen to the rank of sergeant, and had served during twenty-two years, partly in India, including the Terah Campaign, and in South Africa (2 medals and 7 clasps), and was ultimately invalided out of the service, time expired. He then became a gardener to a retired army officer, a position which he held until the outbreak of the present war. He was then 57 years of age, but on the chance of getting back to the Army again he gave up his civil employment, went to Carlisle, and ascertaining that all men under 35 years of age were being sent from the dépôt to France, he presented himself at the recruiting office, stating that he was 34 years and 7 months of age. Though he had defective vision of the right eye, from an accident which had occurred in civil life, he successfully passed

the eye-tests as only an old soldier knows how. He was accepted, and presently went out to France, shooting off his left shoulder in order to get the benefit of his left eye. He followed the fortunes of his regiment until September 1915, when a bursting shell blew the parapet and side of the trench on to him, and he was buried in the débris and considerably bruised. At the Field Ambulance, to which he was conveyed after he was taken out, he was placed next to a wounded officer of the Gordons, who recognised him as an old soldier. This officer communicated the circumstances to the commanding officer of the Gordons, and through the late Colonel Cole of the King's Own Scottish Borderers, MacDonald was granted permission to wear his ribbons, "a permission," he said, "which was little use, as you could not buy ribbons in France." After being in hospital for some time, and attempting duty again, MacDonald was ultimately invalided out of the service, partly on account of nervousness engendered by the shell shock, and partly on account of lameness from a contusion to the left thigh. He then took service as an attendant in a hospital for the insane, but the work was uncongenial, and he happened to be passing through Dundee when he was "held up" by an abscess developing on his scalp.

I found him to be somewhat nervous and a little tremulous, but I had no reason to suspect alcoholic indulgence, and believed that these were symptoms of his injury in the trenches. An incision and a few days' dressing relieved the inflammatory condition in the scalp; and now, when I placed my hand on his vertex, I discovered that he had a congenital symmetrical perforation of both parietals, in size, shape, and position exactly like that of Ross, whom I had seen before. His extraordinary likeness to Ross, his manner, his slight stature, and his general build, his slightly Mongolian type of countenance, and his cranium tending to microcephalism, all struck me so forcibly that I charged him with having served with me in India many years previously, and having been under my care in the Dundee Royal Infirmary with a broken arm. To this he replied, "No, sir; that was my brother Robert." He then told me that his real name was Ross, but that he had assumed the name of MacDonald on re-enlistment. His father had been a sergeant-major in the 92nd. The patient was one of a family of twelve—nine sons and three daughters. One brother had died in the Army of pneumonia; one brother was at present serving in the Royal Navy, and one had died of consumption, while no less than five had been killed in the present war.

He is a widower with two sons and one daughter. One son is known to have been killed in the Cameron Highlanders, while the other had been missing for some weeks, and was supposed to have been taken prisoner or killed. He knew of his own and his brother Robert's defects in their skulls, and maintains that neither of his parents, nor any other brothers or sisters, nor his own children, had a similar peculiarity. I have recently had a letter from this man, who is now 60 years of age. He has re-enlisted in a well-known Highland regiment under an assumed name, and stating that his age is 37 years and 6 months, for he informs me that no man over 38 is being sent to France.

He is a well-knit, spare, if slightly undersized, man; quick, active, and alert, both mentally and physically. I have already mentioned the slight Mongolian cast of his features and the microcephalism of his skull, but he presents no other abnormality; but, separated by a mesial bridge of bone, each perforation of the parietal is somewhat quadrilateral in shape, with rounded angles, and probably measures about $1\frac{1}{4}$ in. in length by $\frac{3}{4}$ in. in breadth. The skin moves freely over the defective areas and the deficiencies give rise to no discomfort in any way.

When one considers the great rarity of this congenital defect one cannot but be surprised how widespread is the knowledge of its existence. Description of specimens in journals and newspapers under such fanciful headings as "Flint-Knife Surgery," "Pre-historic Trepanning," etc., has certainly led to undue publicity and to a general impression that such crania are common. While not maintaining that the skull was never opened in prehistoric times, except in the removal of fragments shattered by an injury, one must emphasise how utterly devoid of any inflammatory changes is the bone around the openings. That fact, the site of the openings, and their symmetry, render untenable so fascinating a theory.

Only fourteen examples of this deformity have now been described. In 1858 Sir George M. Humphry first called attention to the condition, describing the abnormality from a skull in the Cambridge Museum, though the perforation was unilateral.³ In 1865 Professor Sir William Turner described the calvaria of an adult female which presented the double congenital perforation.⁴ In the following year Wraný described four cases,⁵ and in 1875 Paul Broca added another three, one being a skull presented by Baron Larrey, Surgeon-in-Chief in the Army of Napoleon Buonaparte, to the Val-de-Grâce Museum in Paris.⁶ More



Congenital Symmetrical Perforation of Parietals. The two lighter areas in the upper part of the radiogram indicate the osseous deficiencies.

recently Professor Paterson has described three cases, and these, with my two cases, complete the list of publications on the subject.⁷

Since I am dealing here, as I have done previously, with a living example of this congenital defect, I need not quote from others the condition found in the bones, which is fully given in the papers referred to. The deformity is essentially a want of transformation of membrane into bone round the region where the frequent parietal foramina are normally found. Microcephalism as such has nothing to do with the defect. Indeed, it is more likely that the Mongolian cast of features may be more suggestive of osseous abnormalities than microcephalism. Microcephalic skulls have always had a fascination for the anatomist, and I have had peculiar opportunities during many years of examining microcephalic imbeciles, and sometimes their macerated crania, and I have never found any congenital defect in the parietal bones, nor is the presence of the parietal foramina more common than in normal skulls; while, on the other hand, peculiarities of ossification and the interposition of Wormian bones is the rule and not the exception in the skulls of Mongolian imbeciles. Microcephalism depends on the growth of the brain, not on an arrest of development of the skull, and neither synostosis nor osseous defect is observable; the bones are small and thin, but normal. In conclusion I desire to point out that in the radiogram, which was taken for me by Dr. Pirie, the relation between the focus tube and the photographic plate has tended to diminish the size of the parietal openings in their antero-posterior diameter, but I thought it better to permit this than to produce a general deformity in the radiographic representation of the skull as a whole.

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CLINICAL CASES FROM MEDICAL DIVISION, ROYAL VICTORIA HOSPITAL, NETLEY.

By A. FERGUS HEWAT, F.R.C.P.,
Consulting Physician, Netley ; Captain, R.A.M.C.

THE following cases have been under my care at the Royal Victoria Hospital, Netley, and present certain features of interest:—

CASE I.—*Early Case of Cerebro-Spinal Syphilis Simulating Epilepsy.*—This patient, aged 43, was admitted with a diagnosis of major epilepsy. For twelve years he had been a stoker in the Royal Navy, and quite frankly admitted he suffered from syphilis sixteen years ago. He had a chancre, which was treated locally with black wash. He had no secondary rash. After leaving the Navy he worked in a fire brigade and as a dock labourer. He is a Scotsman, and has always indulged freely in alcohol when funds would permit, but has never been "crimed." In December 1914 he had his first convulsive seizure while working at the docks. On the previous night he drank a bottle of whisky. He says he must have been about half an hour in the "fit." He joined the A.S.C. in January 1915, and served first in France and then at Salonika. Since joining the Army he has had about eight convulsive seizures—some in France and others at Salonika. He says that his "fits" always came on after he had taken a "good quantity" of rum. He was perfectly certain he never had any fit during childhood.

He is a tall, powerfully built man. His heart, lungs, abdomen, and urine show no abnormality. Speech is perfect, and his mental state is clear; there are no errors in ordinary arithmetic. Both pupils show the typical Argyll-Robertson phenomenon. There is no evidence of other disease of his eyes. No motor paresis. His deep reflexes in arms and lower limbs are all increased and the superficial reflexes are diminished. Plantar reflexes are flexion in type. There is no fine tremor of hands. There are no objective sensory changes. The Wassermann reaction is strongly positive. Shortly after admission I saw him recovering from a convulsive seizure which appeared to be typical of an attack occurring in the course of general paralysis of the insane or epilepsy.

Remarks.—The question of diagnosis here presented some interesting features. In view of the fact that he had definite syphilis, no convulsive seizure till 41 years of age, typical Argyll-Robertson pupils, and a fully positive Wassermann reaction, the diagnosis of major epilepsy was revised. The next question was—Is this man suffering from early general paralysis or simply

from early cerebro-spinal syphilis? One inclined to the latter alternative, because there were no early symptoms of general paralysis, no tremor, yet definite convulsive seizures which had begun eighteen months ago. I asked my colleague, Captain B. H. Shaw of Stafford County Asylum, to see the patient with me, and he agreed in thinking we were not dealing with an early case of general paralysis, and in all probability the man would not pass to that condition. There seems no doubt that most of his fits were aggravated by alcohol, but not entirely due to that cause, because he had two or three fits in hospital during a period of about eight teetotal weeks. The case illustrates the importance of submitting the serum of a patient, who develops epileptiform seizures for the first time between, say, 35 and 50 years of age, to the Wassermann reaction.

CASE II.—*Functional Paralysis of Right Arm Caused by Suggestion.*—The patient is a re-enlisted soldier, and arrived here with a diagnosis of ulnar paralysis. He was wounded in France, six months previous to his admission, by a bullet passing through the fleshy part of his shoulder above the middle third of his clavicle. Since then he says there has been gradual diminution of power in his right arm. About four months ago, however, he was fit enough to be sent to Egypt. There a further degree of paresis developed, until, finally, he was invalided home because of the marked weakness of his right arm. He has been unable to use his rifle for months.

Physical Examination.—There are two small healed wounds where the bullet had passed through the muscles lateral to the junction of the neck with the shoulder. The wound was above the region of the brachial plexus, but the patient informed me that the bullet had damaged the nerves in that region. The arm and hand were distinctly limp, and showed a tendency to blueness as compared with the left. The muscles felt flabby. The patient was, however, able to carry out the various movements of arm, wrist, and fingers, but not against resistance. He showed indefinite anæsthesia and analgesia throughout the arm. His answers to touch and pain were irregular. The paralysis did not correspond to any nerve or root lesion. His general health was good.

Treatment and Progress.—After a few days in the ward the patient was taken to the electrical department and the paresed muscles of his arm contracted strongly under electrical stimulation. At the same time he was told that no nerve in his neck had been injured by the bullet. He expressed very genuine surprise when he saw his paralysed arm move vigorously. He was then put to bed behind screens on a strict milk-isolation treatment. In the evening he was very angry

with the Weir-Mitchell treatment, which he looked on as a punishment. He, however, grasped one's hand well, and was assured that the screens, etc., were part of the treatment. On the following day, after another electrical application, he had regained complete and full power of his arm, and his sensory disturbances had gone. Three days later he was returned to full duty.

Remarks.—This case serves as an example of how a man will become obsessed with the fact that he has received a nerve injury and must in consequence have a paralysis. Someone doubtless suggested this to him, and the result was a typical functional paralysis. It is not a case of malingering, but a cortical misinterpretation which, when his error was forcibly demonstrated to him, disappeared. The diagnosis was simple, because a very brief anatomical examination could with confidence exclude an organic nerve lesion.

CASE III.—*Functional Spasm of Both Hands.*—This lad, aged 19, was sent to Netley suffering from inability to open the palms of both hands.

History.—There is nothing abnormal to note in his family history. He left school at the age of 14 and began farm work. He says that about two years ago, while working amongst turnips in very wet weather, pain developed in his hands. This gradually became worse, and pain developed in legs, arms, and neck. He was in bed a week and off work ten days. On returning to work he says his hands were swollen up, but he was able to manipulate the reins of his horse. Since this illness his fingers have been more or less firmly flexed on his palms. Owing to the condition of his hands he was passed fit for labouring work at home. Has been doing army work for three weeks.

Physical Examination.—He has good average bodily development, but his mental state is below par. He is nervous and apprehensive. His speech is peculiarly stilted, and he does not reply readily to questions. Vasomotor control is defective. The condition of his forearms and hands at once attracts attention. Both hands are firmly closed, the tips of his fingers resting on the palms of his hands. He has free use of both his thumbs. Forearms are well developed, flexors specially so. On trying to extend his fingers passively, very considerable counter force is set up, and the muscles in his forearms contract powerfully. There is no analgesia or anæsthesia in forearms or hands. Deep reflexes are present and not increased. During sleep the first and second fingers of both hands can be fully extended. At the same time one noted a definite contracture of the palmar fascia of both hands which prevented the third and fourth fingers being extended fully. These manipulations awoke him, and immediately firm flexion of all

fingers took place. Beyond some degree of asymmetry of chest there is nothing further abnormal to note.

Treatment.—Strict milk-isolation behind screens was prescribed. At the same time he was not allowed to read, smoke, or speak to anyone. Twice daily he was encouraged to move his fingers, and made to perform finger exercises. Three days after this treatment began he was able to extend his fingers to about 60 per cent. of their normal extent. He was also able to abduct and adduct his fingers fairly well. In two weeks' time he was allowed up, given full diet, and screens removed. The power of movement in his hands and fingers was now quite satisfactory, but not complete, because of contracture of the palmar fascia, due probably to the constant state of flexion in which he kept his fingers. He was sent back to duty in three weeks from the date of admission.

Remarks.—He was not considered a malingerer. The flexion spasm had doubtless taken place when he suffered from the painful condition of his hands, and had developed into a functional state due to an obsession, set up by the pain, that he was unable to open his hands.

CASE IV.—*Poliomyelitis.*—A territorial, invalided home from India, with a diagnosis of myelitis, gave the following history:—

On 12th August 1915, while at early morning parade, his company was engaged in a form of "leap-frog" as part of their physical drill. The weather was very hot at the time. While the patient was bending down and men jumping over him in rapid succession he fell to the ground and at once complained of pains in his back. He was able to finish his morning drill because the squad was at once changed to another type of exercise. Later in the day he reported to his regimental officer that he had pain in his back. He was put on light duty at billets. His pain, however, gradually increased in severity, and on the fifth day after the accident he was walking with the aid of a stick. He reported sick to his regimental medical officer, and was given medicine and duty, but was unable to go on parade. That night he was unable to pass water and was sent to hospital, where he was catheterised three times daily for a month. When he was put to bed he noticed, rather suddenly, weakness and paresis develop in both limbs. He says his temperature was 101° F.; this fell next day, and pain in back rapidly diminished. He noticed that power in the left lower limb recovered quickly.

Physical examination at Netley, April 1916, i.e. about eight months after the accident. He is unable to walk except by the aid of crutches. This he does well, because he has full use of the left lower limb, which shows no motor, sensory, or reflex abnormality. The right lower limb

is cold, and presents a distinctly bluish appearance. He can flex his thigh on his abdomen, and has some power of adduction. There are no voluntary movements at the knee, ankle, or toe joints. The muscles of the thigh and leg are in an irritable state, and fine fibrillary tremors can be elicited. There is complete reaction of degeneration in the muscles of the thigh and leg, except the adductors, which react, but not fully. There is no objective sensory disturbance; all deep and superficial reflexes are abolished, but he has control of both bladder and bowels. There is some pain on pressure over the lumbar region. He denies syphilis and gonorrhœa, but has a positive Wassermann reaction.

Remarks.—His state at present points strongly to the pathology of his condition being due to the effects of an acute poliomyelitis; but in coming to this conclusion one is met, firstly, by the fact that those who had the opportunity of seeing the case in its early stages diagnosed myelitis; and, secondly, he has a positive “Wassermann.” Myelitis would suggest itself partly by the mode of onset, the type of pain, retention of urine, and paralysis or paresis of both lower limbs. This case, however, presents no sensory disturbances, and there is a unilateral paralysis which has picked off muscle groups—not segments. It is possible, however, to have a certain amount of transient meningomyelitis associated with a poliomyelitis. Hæmatomyelia is probably not the cause of the condition because of the unilateral lesion, absence of sudden paralysis just after the accident, and the type of recovery.

CASE V.—*Aneurysm of Descending Thoracic Aorta.*—Broadbent has classified aneurysms of the aorta as—

(i.) Aneurysms of symptoms; and (ii.) aneurysms of physical signs. One feels tempted to suggest a third class, viz. (iii.) aneurysms discovered accidentally.

The following might be so classified, and I am indebted to Captain Elliott for sending me the case.

History.—The patient served for twelve years in the regular Army as a saddler in the R.F.A. He is 44 years of age, left the Army in 1898, rejoining in August 1914. He says he has always had excellent health, and denies venereal disease. He went to France in December 1914, and after a year's service there was transferred to Salonika. He says he was quite well during his service abroad till early in January 1916, when he developed sciatica, which caused him to report sick. He was sent to hospital and invalided home as a case of sciatica. During his service abroad he has always done his full work both in transshipping and working the guns. He has had no symptoms of cardiac disease.

Physical examination on admission to Netley, *i.e.* three months after reporting sick, suffering from sciatica. He suffers from pain, wasting, and tenderness of left lower limb. No local cause of pressure can be discovered. The apex beat of the heart is in the 5th intercostal space, $\frac{1}{2}$ in. outside mid-clavicular line. Pulsation there is localised and forcible. The right subclavicular region is rather more prominent than the left, and the superficial veins are slightly dilated. The left border of the heart is situated $\frac{3}{4}$ in. outside the mid-clavicular line in the 5th space. Slight dulness is detected in the 1st and 2nd interspaces on both sides of the sternum.

On auscultation in the mitral area the first sound is booming and the second is replaced by a short systolic murmur. At the aortic area the first sound is replaced by a loud systolic murmur, the second sound is accentuated and followed by a long, loud, blowing diastolic murmur. Diastolic murmurs are heard at both pulmonary and tricuspid areas. The left radial pulse has a feebler amplitude than the right, but the difference between right and left is very slight. Systolic pressure much increased, diastolic pressure is low. The larynx and the pupils are normal. Lungs clear. Urine normal. Wassermann reaction positive. He complains of absolutely no pain in the thorax, has no cough or shortness of breath, and wonders why so much interest is being taken in his chest, when his mind is much more occupied by the condition of his right lower limb. X-ray examination showed a pulsating swelling to the left of the body of the sternum at the junction of arch with thoracic aorta.

Remarks.—The diagnosis by aid of the X-ray appears to be an aneurysm at the upper part of the descending thoracic aorta, associated with aortic valvular disease due to a syphilitic infection. It is of interest to note the extraordinary absence of symptoms, despite the very marked cardiac and arterial disease. Further, it is to be noted that a man with well-marked aortic regurgitation was able to do his full work with his battery, for it is inconceivable to think that the cardiac physical signs only developed after he was laid up with sciatica.

I am indebted to the kindness of Colonel T. J. R. Lucas, C.B., A.M.S., Officer Commanding, Netley Hospital, for permission to publish the above records.

OBITUARY.

LIEUTENANT-COLONEL R. E. WOOD, F.R.C.S.E.,
R.A.M.C.(T.F.).

THE news of the sudden death of Dr. Russell Elliot Wood at Dunbar on the 8th February last caused widespread sorrow and regret among the wide circle of his medical and lay friends in Edinburgh. For several years past Dr. Wood's intimates had known that he suffered at intervals from attacks of cardiac pain and discomfort, but though this naturally caused disquiet and anxiety among them, the continued absence of any of the physical indications of cardiovascular disease, coupled with the persistence at all other times of his usual almost boyish exuberance of spirit and vitality, always fostered the hope and trust that he might be spared for some years longer.

Some three years ago he retired from his post of surgeon to the Lanarkshire Yeomanry, but on the outbreak of the war he at once offered himself for military duty. His offer was accepted, and accordingly, about two years ago, he left his practice and proceeded to Dunbar. Up to the evening of the 5th February he was attending to his military duties there, and it was whilst dressing on the morning of the 6th that his fatal heart seizure occurred. In this way he died practically in harness, at the relatively early age of 62 years.

Born in Edinburgh, Russell Wood was the youngest son of the late Dr. Andrew Wood, and thus was the representative in the fifth generation of the Woods, who, as a family, had been well-known and highly esteemed Edinburgh doctors for two hundred years. His grandfather's grandfather, William Wood, became a Fellow of the Royal College of Surgeons of Edinburgh in 1716, and he was succeeded by a son Andrew, who joined that College in 1769. Next came William Wood, secundus, born in 1782, and after him Andrew Wood, secundus—Russell Wood's father, born in 1810. To the medical fraternity, and indeed to all interested in Old Edinburgh, the localities where these men lived and practised is illustrating. The first William and the first Andrew lived and worked in the Old Town, somewhere in the neighbourhood of the Canongate. The second William, leaving the Horse Wynd in which he had been born, migrated to the New Town, and lived in South Hanover Street, where his son, the second Andrew Wood, first saw the light. This second Andrew lived in Darnaway Street, and it was there that Russell Wood was born and lived.

Like his father before him, Russell Wood passed his school and college days in Edinburgh, the former at the Academy, the latter

within the portals of the University and the extra-mural school. As schoolboy and student he was a great favourite, alike with his teachers and his fellows, and among the latter his excellent physique rendered him a great acquisition on the football field and on the racing track. After passing through the College curriculum he graduated M.B., C.M., in 1877, and then served for the prescribed periods as resident house-surgeon in the Royal Infirmary, in the Sick Children's Hospital, and in the Maternity Hospital. In 1879 troubles in Zululand had begun, and he at once volunteered for military medical work there. He was thus sent to South Africa, where he saw a good deal of active service, being present at several engagements, and being in the square at the concluding battle of Ulundi. For his services he was awarded the Zulu medal and clasp.

Returning to Edinburgh, he obtained the Fellowship of the Royal College of Surgeons, and having joined the medical staff of the New Town Dispensary, he started medical practice. Soon his sterling qualities gained for him the confidence, esteem, and affection of his patients, and of his medical brethren, and he proved himself a worthy successor to his medical ancestry. Amongst other work which, as years rolled on, he was called upon to perform, were those of Governor and, later on, Surgeon to Donaldson's Hospital, and of Medical Adviser to the Sibbald Pension Fund. He was also a member of the Council of the Royal College of Surgeons of Edinburgh.

But a post which he held with very great pleasure and pride was that of surgeon to the Lanarkshire Yeomanry Cavalry. Inasmuch as this demanded of him annually only some eight or ten days of active duty, he looked forward to the annual trainings as he did to his annual holidays. Always fond of horses and of horsemanship, he wholeheartedly devoted himself to this duty for some twenty-five years, and his enthusiasm for and attachment to his distinguished regiment found vent in his compilation and publication of its history.

Absolutely devoid of ostentation and self-consciousness, Russell Wood was one with whom in all things, medical or lay, it was a real pleasure to work. In medical practice his sole object was the benefit of his patients, and the means—old-fashioned or recent—by which this could be attained were all that concerned him. Withal, as one might have expected, he was conservative in his type of mind. He well knew that, inasmuch as to each of us the additions to the sum of medical knowledge made by one's own generation are apt to loom unduly great in volume and importance, so to each of us careful scrutiny and proper perspective are essential in our efforts after truth. With many of the recent embarkations in medicine, medical education, and State medicine he had little sympathy. He was a member of the Medical Guild—the association of non-panel practitioners in Edinburgh—and he took a lively interest in its doings.

As regards the trend of medicine towards officialdom, and as regards some of the recent changes in medical education, he was often more than dubious. Of the Carnegie University Fee Fund he used bluntly to say that the money would have been much better spent in the way of enabling old professors to go, than of enabling young students to come.

Russell Wood was a sportsman in the Anglo-Saxon and highest meaning of the term. Honest, open-hearted, and fearless in the expression of his opinions, he was also generous and considerate in his treatment of the opinions and statements of others, and no one could show more consistent respect for the feelings of his neighbours than he. As a companion he was delightful, and at the festive meetings of the Medico-Chirurgical, Æsculapian, and other Edinburgh clubs his presence and conversation always brought brightness and cheerfulness to the gatherings, and his songs, often original, were highly appreciated.

He leaves a widow, a son, and a daughter to lament his loss.

A. J.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

W. T. RITCHIE, M.D., EDWIN MATTHEW, M.D., J. D. COMRIE, M.D.,
AND A. GOODALL, M.D.

HAY FEVER.

SCHEPPEGRELL (*New York Med. Journ.*, 9th December 1915) in a statistical inquiry into this disease dissipates several fallacious ideas generally held. One idea, that hay fever does not occur south of the thirty-fifth parallel of latitude, he found to be quite erroneous, for it is just as common among the Southern States as in States north of that degree. Again, the farming population and negroes, both popularly supposed to be to a large extent immune, were found to be just as frequently affected as other people, the farmers being especially prone to it. There appear to be two forms of hay fever—the spring and summer and the autumn varieties; the former being mainly caused by the pollen of grasses and the latter chiefly due to the pollen of rag-weeds. Attacks of the malady occur simply when the amount of pollen in the atmosphere becomes too great for the degree of immunity of the individuals concerned, but they occur most frequently while the florescence of the pollen-producing weeds is at its height, and the season of incidence may be delayed by rains which prevent the spread of the pollen, or advanced by weather conditions which accelerate its growth, or shortened by the early onset of frost in autumn. It was found by a circular to physicians in Louisiana that the percentage of persons who suffer from hay fever is about 1 per cent. of the entire population; but it is less common in wooded districts and above an elevation of 6000 feet. The autumn form is more than twice as common as the summer form.

RECURRENT TUBERCULOUS PLEURISY.

Piéry draws attention to a mild form of pulmonary tuberculosis (*Presse Méd.*, 21st December 1916) which he states is extremely common though its real nature is generally unrecognised. It occurs as a localised pleurisy about the fissures of the lungs, often accompanied by a slight pneumonia, with rise of temperature and general symptoms like dyspepsia, palpitation, loss of weight, etc. The symptoms pass off in 3 or 4 weeks, but there is a great tendency to recurrence after a

short time. This condition is very liable to affect soldiers, the writer finds, and it demands treatment in hospital, where after a few weeks the pyrexia passes off, and where a stay of six weeks under suitable conditions of rest in bed, etc., will generally effect a cure and allow the soldier to return as an effective.

STROPHANTHIN IN ACUTE CARDIAC FAILURE.

Hay (*Liverpool Med. Chir. Journ.*, No. 69, 1916) records the use of large doses of strophanthin administered intravenously with good result in threatened death from cardiac failure. Acute cardiac failure is in many cases due to auricular fibrillation, which can be recognised by dilatation of the ventricles, dyspnoea, cyanosis, precordial pain, oedema, and particularly by increased rate of the heart-beat with great irregularity in force and frequency (the delirium cordis of old writers). Of all drugs those of the digitalis group are most useful in steadying the heart while in this condition, but the onset of the cardiac failure is sometimes so sudden, and the downward progress so rapid, that medication by the mouth may be too slow to be of any service. Again, at times the patient's stomach is so sensitive that it will not tolerate any member of the digitalis group. In such cases strophanthin injected into a vein produces immediate and definite slowing of the heart and rapid amelioration of the patient's condition, and has without doubt saved many lives. The writer usually injects it in dose of 0.6 to 1 milligram ($\frac{1}{100}$ to $\frac{1}{64}$ of a grain); the slowing shows itself within half an hour, and the dose can be repeated in a few hours if necessary.

TREATMENT OF DIABETES.

Moses (*Med. Record*, December 1916) gives a *résumé* of the views on treatment of this disease at the present. Guelpa about 1909 was the first to recommend the fasting treatment combined with purgation, and a definite programme for fasting and subsequent increase of diet has been drawn up by Allen. In fat, elderly, and long-standing cases the fat and protein are successively omitted from the food, and the carbohydrate is gradually decreased; while in ordinary cases the patient simply ceases to take food, and maintains this fast for two days; during the fast, water, tea and coffee are allowed, and if at the end of two days the urine is not sugar-free the fast is continued with the addition of a little clear meat broth; thereafter carbohydrate is gradually added to the diet, 5 grammes at a time. After the urine has been sugar-free two days, protein in the form of eggs, and later of meat, is gradually added, and later still fat is given in limited amount. If sugar reappears, fasting for 24 hours is resumed, with subsequent diminution of the diet. A small amount of alcohol is regularly allowed in cases of threatened acidosis.

TREATMENT OF ANTERIOR POLIOMYELITIS.

So many children have been affected by the recent epidemic of anterior poliomyelitis that their orthopædic after-treatment has become a matter of great importance. Whitman, Wright, and Bartine contribute papers on this subject (*ibid.*). This epidemic has been remarkable for its high death-rate on the one hand and for the large number of complete recoveries, amounting possibly to 20 per cent., on the other. Prevention of deformity is the most important part of the treatment from first to last. It develops insidiously and rapidly, its first indication being a sense of discomfort when a habitual attitude is changed. Preventive treatment consists in moving all the joints of any affected part through their full range of movement at least twice daily. Postures should be alternated and attitudes that lead to deformity should be restrained. Massage is useful for improvement of nutrition, and warm baths both improve the circulation and allow of greater freedom in movement as weak limbs are floated up against gravity. Electricity is not found of much benefit by the writer in young children, who are apt to be frightened by it. Muscle training, aided sometimes by operative treatment, such as regrafting of muscular attachments, and often by braces designed to prevent deformity and permit locomotion, is very important. It has been found from previous epidemics, *e.g.* that of 1907, that while signs of recovery should begin at once it is impossible to predict the degree of final paralysis in any case, and improvement may continue for many years. J. D. C.

SURGERY.

UNDER THE CHARGE OF

J. W. STRUTHERS, F.R.C.S., D. P. D. WILKIE, F.R.C.S.,
AND JAMES M. GRAHAM, F.R.C.S.

THE TREATMENT OF WOUNDS OF THE THORACIC DUCT.

HARRISON (*Brit. Journ. of Surg.*, October 1916) discusses the treatment of wounds of the thoracic duct and describes a case of his own in which the divided end of the duct was successfully sutured to the external jugular vein.

Four methods of treatment are available—suture, implantation into a vein, ligation of the duct, and tamponade of the wound in the neck.

Repair by suturing the wound is the ideal method of treatment, and in five cases reported all were successful. When the wound is merely a slit this may be sutured, or if the duct has been completely divided it may be possible to join end to end.

When suture of the duct is impossible the next most rational proceeding is to implant the cut end of the duct into an adjacent vein.

The difficulties in accomplishing such a union may be both anatomical and technical; but as a rule the anatomical difficulty does not arise in these cases, because it is when the duct is abnormal in its course that it is liable to be injured. The duct which enters the veins in the normal manner is rarely injured. Numerous veins are available for implantation of a divided duct, and it is not necessary to take a large vein like the internal jugular. In the author's own case the external jugular was used, as it had already been divided and lay conveniently, the junction being made above the level of the clavicle; if the clavicle hindered access it should be divided. Under these circumstances technical difficulties are not great, and the suturing is similar to that employed in blood-vessel surgery.

There is little risk of blood flowing into the duct after the anastomosis. The chyle normally enters the vein, and the tendency is for the flow to be in an onward direction, owing to the aspiration of the respiratory movements. There is, of course, a distinct possibility of a small clot forming at the sutured line and of this being carried into the general circulation. In order to minimise this risk the author immobilised the neck in a splint from the tenth to the seventeenth day.

Parsons and Sargent have shown that in 18 out of 40 cases the thoracic duct has two terminal branches, so that a simple ligature of a divided duct may be expected to be successful in nearly half the cases met with. In addition there appear to be small collateral vessels which communicate with lymphatics of the right arm and right side of the neck at their opening into the right subclavian vein. These two facts explain the astonishing number of cures in cases which have been simply ligated or plugged. It is therefore advisable always to examine the duct as far as is possible in order to ascertain if a second branch is present, in which case ligation of the wounded branch should be satisfactory.

Should a second branch not be present, ligation of the duct can only be followed at best by a prolonged convalescence in which the patient will become emaciated and suffer severely from thirst.

The method of treatment by tamponade should be regarded as the *dernier ressort*, and should only be applied if the methods already mentioned are not possible.

In addition to emaciation and thirst there will be more or less persistent chylorrhœa. In such cases it is important to attend to the diet and to limit especially the amount of fatty foods. The thirst may be allayed by continuous saline infusion into the right arm or right side of the chest.

SUPRAPUBIC PROSTATECTOMY UNDER LOCAL ANÆSTHESIA.

Suprapubic cystotomy can be satisfactorily and rapidly done under local anæsthesia, although the patient frequently complains of some

pain when the wound is made in the bladder. Barringer (*Surg., Gyn., and Obstet.*, December 1916) has removed the prostate by the suprapubic route under local anæsthesia with $\frac{1}{2}$ or 1 per cent. novocaine.

A preliminary dose of quarter of a grain of morphia is given half an hour before the operation. After infiltrating the tissues the bladder is exposed by a median incision. The anæsthetic is then injected into the bladder-wall and an opening is made into the bladder sufficient to admit two fingers and towards its upper part. The prostate and its sheath are thoroughly infiltrated with one per cent. novocaine, using a 4-inch 18-gauge needle.

Particular care is taken to infiltrate the portion of the sheath between the lateral lobes to the depth of half to one inch, as this is where the first tear into the sheath is made and where pain might be expected. During this procedure the prostate should be elevated by a finger in the rectum.

After an interval of five minutes the superior wall of the urethra is torn through and the prostatic sheath is entered. If the patient feels pain the separation of the prostate is stopped and a further area is infiltrated. In this way the infiltration keeps pace with the steps of the operation, and is continued if there is any suggestion of pain. As a rule thirty or forty minutes are required to complete the operation, and pain is less likely to be caused if there is no hurry. If the final shelling out of the prostate is painful a few whiffs of gas can be given to the patient.

Three of the author's cases complained of slight pain during the operation but suffered from no shock. In the remaining case the patient felt considerable pain because an attempt was made to remove lateral lobes which did not exist. From his somewhat limited experience with this method of operation the author states that the hæmorrhage and trauma are less than after a general anæsthetic.

THE ACTUAL CAUTERY IN THE TREATMENT OF ULCER OF THE STOMACH.

Over two years ago Balfour described the use of the actual cautery in the treatment of certain chronic ulcers of the lesser curvature of the stomach, the cauterised area being subsequently sutured.

Scudder and Harvey (*Surg., Gyn., and Obstet.*, December 1916) have carried out an experimental investigation on the subject and believe that the method is a valuable one. They have also operated on cases of chronic ulcer on the lesser curvature of the stomach, according to Balfour's method, and have in addition destroyed ulcers upon the posterior surface of the stomach and have followed the cauterisation with suture of the ulcerated area.

The chief object of their experiments was to determine whether

there is any difference in the reparative process after cauterisation of the stomach wall as compared with the repair following simple incisions with the knife. The experiments were made upon dogs. Their conclusions are as follows:—

The amount of tissue injured by the cautery is slightly greater than that by the knife. No marked difference in the rapidity of repair was demonstrated. The process of repair after cauterisation is normal, and similar to the changes after a simple incision in the stomach wall. It is probable, therefore, that the method is a safe one for human cases.

The method is applicable to a chronic ulcer seated upon the lesser curvature so far away from the pylorus as to make removal difficult. Such an ulcer may be cauterised from the centre out, as suggested by Balfour, so that the loss of substance occasioned by the cautery may be as extensive as one and a half inches in diameter, and the edges may be then approximated with the assurance of a proper healing of the wound.

Ulcers on the posterior surface of the stomach, after free exposure by a gastrotomy, may be treated similarly. Both edges and base may be thoroughly cauterised even when the latter is adherent to the pancreas, and if the edges are sutured together repair will proceed satisfactorily. Certain chronic ulcers adherent to the posterior parietes and pancreas do not lend themselves to easy and safe excision and suture, and the cautery is sometimes applicable to this special group of cases. The cautery will also destroy a cancer commencing in the edges of the ulcer. It is generally recognised that in order to close the stomach after a simple excision of a portion of the gastric wall a very large wound remains to be sutured. No such gaping wound follows the use of the cautery, and the stomach is closed more easily than after excision.

In using the cautery, as in simple excision of a portion of the stomach wall, it is important to have the stomach mobilised and the affected area carefully controlled so that the ulcer is rendered accessible. For this purpose the assistant should grasp the chronic ulcer from the outside, the hand being introduced within the abdomen. Clamps are seldom needed, either to prevent hæmorrhage or to avoid soiling. The best suture material to employ in human cases is No. 1 chromic catgut. It has not been found necessary to reinforce the sutured area by Lembert stitches, but if this can be done it is wise to do so. Finally, the authors agree with Mayo that, after any extensive plastic operation on the stomach, a gastro-enterostomy should be done. J. M. G.

OBSTETRICS AND GYNECOLOGY.

UNDER THE CHARGE OF

A. H. F. BARBOUR, M.D., AND J. W. BALLANTYNE, M.D.

BIRTH OF A DICEPHALOUS MONSTROSITY.

PROFESSOR A. HERRGOTT of Nancy describes a difficult case of labour in which the birth of the child was impeded by its dicephalous nature (*Ann. de gynéc. et d'obstét.*, September-October 1916, 2nd s. vol. xii. p. 257). The patient, a woman pregnant for the fourth time, was sent into the maternity hospital at Nancy with a foetus born as far as its pelvis, which was protruding from the maternal passages. The only interesting fact in the hereditary record was the birth of a female child with imperforate anus to the wife of the brother of this woman's husband. During her pregnancy she had been surprised by the large size of her abdomen as compared with what it had been in previous gestations; but there had been no abnormal symptomatology. After she had been about a night in labour the midwife in attendance, finding the os dilated, had ruptured the membranes and had brought out the legs. She could not, however, extract the trunk, and neither could a doctor who was summoned to her aid. After the patient's admittance to the hospital the midwife-in-chief (Mlle. Solmon) recognised that the child was lying in the R.S.A. position, and that the umbilical cord was pulseless. The abdomen of the mother was larger than usual, but was not apparently so large as to indicate a twin pregnancy. Thinking that the delay was due to upward displacement of the arms, the midwife began to try to bring them down, beginning with the posterior one. The body of the child blocked the vagina, and made the insertion of the hand very difficult; but when it had been accomplished, the midwife found to her surprise that the left hand was lying across the chest. By pushing up the foetal body slightly to mobilise it, and then by flexing it laterally she was able to bring out the hand; by a similar manœuvre she brought down the anterior (right) arm, which was lying above the brim. Still the child could not be delivered by traction, and the midwife, beginning to suspect hydrocephalus and to meditate section of the vertebral column to allow the escape of the fluid, telephoned to Professor Herrgott for help; but before his arrival she made more energetic traction upon the foetal trunk, pulling it down and pushing it up alternately, and laterally flexing it strongly. To her amazement she suddenly felt something give way and found a head on the posterior commissure with the face directed to the left side of the vulva; almost immediately afterwards a second head followed, presenting and emerging in the same fashion as the first. The child was a bicephalous female of the derodyme variety, that is to say, there was a single trunk and set of limbs with two heads each possessing a

separate neck. The biparietal diameter of the two heads was 16·75 cm., that of the left head being 8·50 cm. and that of the right one (the second to be born) 8·25 cm. The occipito-frontal diameter of the first was 10·3 cm. and of the second, 10 cm. The bis-acromial diameter was 14·25 cm. The third stage was normal; there was no perineal tear, but a considerable degree of vulvar oedema lasted for three or four days. The recovery of the mother was complete. The cord, it may be added, was short (40 cm.). Professor Herrgott emphasises, and rightly, the value of mobilising the presenting parts in such a difficult labour as this. The efforts at traction made by the first midwife and doctor had jammed the heads at the brim; but the upward push given to the body by the hospital midwife loosened the heads and enabled them to descend one after the other and each presenting by the ear, when what was practically the Prague grip was brought into action. The rest of Professor Herrgott's paper is concerned with the teratology of the case, and it is interesting also from that point of view. Here it will be sufficient to state that the dissection revealed a vertebral column which was double in its upper portion, two venæ cavæ, a very large liver, and a heart with three ventricles (right, left, and intermediate).

HUMAN OMPHALOPAGOUS TWINS.

It is not often nowadays that a new group has to be added to the schemes of classification which prevail in human teratology; but Dr. James F. Gemmill and Mr. James Stewart (*Journ. Anat. and Physiol.*, July 1916, 3rd s. vol. xi. pp. 316-323) make out a good case for the inclusion of the omphalopagous type of double monster, a type which is familiar enough (in osseous fishes) to the zoologist. They describe a pair of uniovular female twins (who survived several days) showing ventral union limited strictly to the umbilical region; and the union consisted of an isthmus which expanded mesially to form a sac of considerable size. From the illustrations which accompany the article it could be seen that this sac lying between the abdomens of the twins had the umbilical cord (single) attached to it; but unfortunately (as is so often the case) the placenta and the portion of cord belonging to it were not available for examination. (It has taken the profession a long time to learn that a foetus without its placenta is an incomplete specimen.) The twins came from a case of triplets, the third child being healthy, well developed, with separate membranes and placenta, and surviving its birth. In each twin the epidermis of the body wall extended over the neck of the isthmus and over a small portion of the sac, the remainder being covered by a thin, pinkish, semi-transparent membrane. One of the twins had well-marked talipes varus. There was no anal aperture in either of them, but each had labia with an opening between which was that of the urogenital canal.

A careful account of the dissection of the twins is given, and the following were among the interesting deviations from the normal which were met with:—The peritoneal cavities of the twins communicated freely in the central mass, which consisted chiefly of coils of small intestine which united in a common canal which opened into a large cæcum with two vermiform appendices; the large intestine also occupied the central mass, but near its termination it sent a short horn into the pelvis of one twin. There was no great omentum, but in both twins there was a wide epiploic foramen leading into a peritoneal recess lying behind the stomach. The urogenital system was very complicated. In both twins all the Müllerian duct derivatives were doubled, the Fallopian and uterine tubes in each being widely separated from one another, the latter opening into vaginæ dilated with fluid. The vaginæ opened in turn into the urogenital canal. In the central mass was a large principal bladder with two necks, one passing downwards into the pelvis of each twin and continued into a corresponding urogenital canal. This bladder received the two ureters of one twin, but only the left ureter of the other, and the last-named twin had its right ureter opening into a small accessory bladder in the right hypogastric region. This accessory bladder was surmounted by a small urachus, and opened through a short narrow passage into the body of the principal bladder, whose two necks led each into a urogenital passage which after receiving the openings of a pair of vaginæ came to the surface between the labia majora. Omphalopagous double monsters (of which this specimen is perhaps the only known instance in the human subject) must be placed between xiphopagous and lecanopagous or ischiopagous fœtuses. The clinical aspects of the case were given by Professor Jardine in the *Lancet* (1916, vol. i. p. 730) under the title of a “Case of Eclampsia with Triplets, two of the Children being United.” The mother was a primipara, 23 years of age, and pregnant at the eighth month. The eclamptic fits were treated successfully by Professor Jardine by submammary saline transfusion, a large dose of Epsom salts by the mouth, and trivalin hypodermically. Two days later labour came on, the membranes ruptured spontaneously, and then (as there was delay) the first head was delivered by forceps; there was difficulty with the delivery of the breech, however, and when examination was made a second breech was found coming down. By making traction on the first child both were brought away, but the mother’s perineum was torn. Another child, a male, was found in the uterus with its membranes unruptured. It was delivered by forceps. There was severe post-partum hæmorrhage, and the patient developed pneumonia and died forty hours later. The united female children weighed 6 lbs.; they lived for several days, passing urine but no meconium; the single male child, weighing 6 lbs., did well. The placentæ weighed about 1½ lb. each; the cord of the single fœtus was

20 ins. long, whilst the united cord of the others was only 3 ins., and its shortness had prevented the descent of the head, necessitating forceps and causing the tearing of the cord at the placenta.

RUPTURE OF THE SCAR OF A PREVIOUS CÆSAREAN SECTION.

Dr. Palmer Findley records an interesting case of rupture of a previous Cæsarean section scar which he saw in Professor Franz's clinic in Berlin in June 1915 (*Amer. Journ. Obstet.*, 1916, vol. lxxiv. pp. 411-432). The woman died two hours after operation for removal of the uterus and escaped child from the abdominal cavity. The examination showed that evidently both the uterine and the abdominal wounds had become infected after the previous Cæsarean section, and it was noted that the uterine scar was low down in the anterior wall (within the lower uterine segment). Dr. Findley has collected together from literature (with a few direct observations) sixty-three cases of rupture of the Cæsarean scar, and has tabulated the conditions and results for convenient reference. His conclusions are as follow:—A perfectly-healed Cæsarean wound may be relied upon to resist the forces of labour, but in view of the fact that the integrity of the wound is an unknown factor in all cases we are constrained to exercise the utmost caution in the conduct of every case in pregnancy and labour following Cæsarean section. Failure to secure perfect healing is accounted for by departure from the principles of suture proposed by Sängér and by septic infection of the uterine wound. If we are to obtain the uniformly good results in respect to wound healing that were obtained in the decade following the introduction of the Sängér method of suture, we must not deviate from these principles. The possible existence of latent gonorrhœal infection may defeat the most painstaking efforts to secure perfect wound healing. Hence it follows that the healing of a Cæsarean wound is always an uncertain factor. When Cæsarean section has been followed by a fever course (75 per cent.) the uterine wound should be regarded as insecure in event of a subsequent pregnancy, and should call for a repeated Cæsarean section at the onset of labour. Sterilisation and hysterectomy should replace conservative Cæsarean section when infection is known to exist. The alternative invites faulty wound healing, if not more disastrous results. Transverse fundal, extra-peritoneal, and cervical incisions have not lessened the liability to rupture in subsequent labours, but, on the contrary, have probably increased the hazard; in this respect Findley agrees with Leopold in his dictum that classical Cæsarean section, with its good results for mother and child, remains the most efficient operation, one which alternative procedures will never supplant or restrict. It is only fair to say, however, that there may be, and are, two opinions on this subject. Findley, further, reaches the conclusion that the possibility of rupture of the scar following Cæsarean section does not

justify sterilisation, but rather calls for the exercise of masterly control in the event of a subsequent pregnancy. All such cases should be hospital ones, and labour should be anticipated by timely repetition of Cæsarean section at the onset of pains if the uterine wound is known to be defective or if some cause for obstruction to the delivery of the child through the natural passage exists. Version, high forceps, uterine tampons, hydrostatic bags, and pituitrin should never be employed in the presence of a Cæsarean scar. Dr. Palmer Findley's last conclusion is of great importance, and reads: "We may conclude that in view of the evidence that not more than 2 per cent. of ruptures occur in subsequent labours, we are not justified in voicing the slogan 'once a Cæsarean section, always a Cæsarean section'; neither are we to rely explicitly upon the integrity of the uterine scar in any case. Furthermore, we would conclude that the liability of rupture is a real danger, and should stand as an argument against the increasing tendency to widen the scope of elective Cæsarean operations." In other words, and as a conclusion to the whole matter, the relative value of Cæsarean section in comparison with other methods of delivery cannot be decided when the patient has recovered from the labour in which it has been employed, but must wait for a verdict till the whole reproductive history of the woman is at an end.

J. W. B.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

W. G. SYM, M.D., F.R.C.S., AND A. MACGILLIVRAY, M.D., D.Sc.

SALVARSAN IN OCULAR DISEASES.

THE following questions are often asked regarding salvarsan in ocular diseases:—In what class of cases it acts best? if it be of any use in other than specific cases—if so, what kind? and if there be any class of cases where its use is contra-indicated, etc.? Dr. Dwight C. Orcutt, Chicago, in a paper read before the Chicago Ophthalmological Society, 17th April 1916 (*Ophthalmology*, 1916), has looked up the record of cases at the Illinois Charitable Eye and Ear Infirmary, has classified each case, and has reported them categorically.

The State began supplying salvarsan and neosalvarsan about July 1914, and continued to do so, rather sparingly, until September 1915. After that time it was impossible to get any, except a few doses of the American product.

In reporting these cases special effort was made to give—(1) Duration of disease; (2) Wassermann reaction; (3) period in which treatment was pursued. Classification was made in the following order:—(1) Optic Atrophies; (2) Ocular Paralysis; (3) Sympathetic

Ophthalmia ; (4) Interstitial Keratitis ; (5) Neuro-retinitis and Vitreous Opacities.

The author's report is based upon cases at the infirmary only, without any attempt at bibliography. A letter, however, was prepared and sent to several of the large institutions asking for a similar report from each, same to be given briefly as a classification and summary.

Optic Atrophies—

C. F. Male, æt. 32, miner.

Wassermann, negative ; duration, 10 months.

Vision—R. $\frac{6}{200}$; L. $\frac{10}{200}$.

Treatment from 29th May to 1st August 1915.

Salvarsan, 2.

Discharged improved ; vision—R. $\frac{15}{200}$; L. $\frac{20}{100}$.

R. L. Male, æt. 31, foreman.

Wasserman, negative ; duration, 10 months.

Vision—R. E. p. l. ; L. E. $\frac{2}{200}$.

Neosalvarsan, 3 ; salvarsan, 2.

Treatment, 4th December 1914 to 16th January 1916.

Discharged improved ; R. $\frac{5}{200}$; L. $\frac{6}{200}$.

C. B. Male, æt. 56, labourer.

Wassermann, + + ; duration, 2 years.

Vision—R. p. l. ; L. nil.

Treatment from 23rd August 1915 to 1st January 1916.

Neosalvarsan, 2.

Discharged, slight improvement ; hand movement, B. E.

W. D. Male, æt. 43, labourer.

Vision—R. $\frac{10}{200}$; L. no p. l.

Wassermann, + + ; duration, 18 months.

Treatment from 2nd March to 21st July 1915.

Salvarsan, 1 ; neosalvarsan, 5.

Discharged, no improvement.

J. R. P. Male, æt. 42, motorman.

Wassermann, negative ; duration, 15 months.

Vision—R. E. $\frac{20}{200}$; L. nil.

Treatment from 11th December 1914 to 8th April 1915.

Neosalvarsan, 2 ; salvarsan, 1.

Reported later blind.

Summary—Optic Atrophies.

Wassermann, positive in two, negative in three.

Duration of all under 2 years.

Average time of treatment, 6 months.

Results—marked improvement in two cases, slight in one, no improvement in two.

It was noticeable in the cases that there was apparently a rapid improvement during the treatment, but later was retrogressive. This, the author states, is probably psychic. It should also be noticed that the negative cases showed the most improvement.

Nerve Paralysis—

C. P. Æt. 35, clerk.

Duration, 8 months.

Very marked ptosis; R. lid and diplopia.

Wassermann, negative; tuberculin.

Vision—R. $\frac{2}{5} \frac{0}{0}$, L. $\frac{2}{2} \frac{0}{0}$.

Treatment, 7th November 1914 to 22nd May 1915.

Neosalvarsan, 4; salvarsan, 2.

Discharged absolutely cured; $\frac{2}{2} \frac{0}{0}$ in either eye.

Sympathetic Ophthalmia—

S. S. Male, æt. 6 years.

L. E. injured 6 months; irritation began in R. E. 2 weeks before admission.

Vision—R. $\frac{2}{2} \frac{0}{0}$, L. nil.

Enucleated left at once.

Treatment from 2nd February to 18th March 1914.

Neosalvarsan, 3; discharged, 24th April 1914; vision $\frac{2}{2} \frac{0}{0}$.

This patient has been seen at intervals, and vision remained the same.

F. W. Male, æt. 18, clerk.

Wassermann, negative; duration, 2 months.

Vision—2nd February 1915, $\frac{2}{2} \frac{0}{0}$.

Treatment, 2nd February to 17th July 1915.

Neosalvarsan, 5; salvarsan, 1.

Discharged; vision $\frac{2}{2} \frac{0}{0}$ right.

The details of this case are: Left eye, cataract (traumatic), two years; lens removed 20th July 1914. No complications, although extraction was difficult, the lens being soft and sticky. Discharged 10th August 1914. Now comes the interesting part of his history. Two months later was struck in the operated eye by fist of a small brother, producing an intra-ocular hæmorrhage. He returned to the hospital 31st January 1915, a month after the injury. Left eye, painful, soft, etc.; right eye, usual findings of irido-cyclitis, and vision had gone from $\frac{2}{2} \frac{0}{0}$ when discharged to $\frac{1}{1} \frac{0}{0}$. Enucleation, 2nd February 1915, giving neosalvarsan the same day; 16th February, neosalvarsan—to be brief, he received neosalvarsan, six injections from 2nd February to 14th July 1915, and the vision gradually improved from $\frac{2}{2} \frac{0}{0}$ 2nd February to $\frac{2}{2} \frac{0}{0}$ when discharged, 17th July 1915. Patient has been seen several times, and is holding his own, and working every day.

There was so much interest in this case that at times mercury and iodides were used, also a series of "sweats," but from the vision improving as by magic the consensus of opinions was that without salvarsan the case would have been hopeless.

It may be concluded from these two cases that the results from salvarsan are flattering in sympathetic ophthalmias.

Interstitial Keratitis—

S. B. *Æt.* 9.

Duration, 2 months.

Vision—hand movement.

Treatment, neosalvarsan, 2.

Greatly improved ; left hospital of own accord.

F. D. Male, *æt.* 21, labourer.

Wassermann, + + + ; duration, 1 month.

Vision—R., finger at 1 ft., L. $\frac{2}{200}$.

Treatment, 12th June to 21st September 1915.

Neosalvarsan, 2 ; salvarsan, 1.

Discharged ; R. $\frac{2}{20}$, L. $\frac{2}{30}$.

The details of this case are : Admitted 12th June 1915. Right eye, hand movement, left $\frac{2}{200}$. Wassermann, positive + + +. Was given injection of salvarsan and two of neosalvarsan from 26th June to 3rd September 1915. Unable to get more, he was discharged 21st September 1915 ; vision, near normal in both eyes. This was one of the worst cases ever seen, and to clear up in three months was much shorter than was expected under the usual treatment.

It is an accepted fact that while interstitial keratitis is to some degree a self-limited disease, yet with the aid of salvarsan its course is hastened at least one-half, and the symptoms greatly ameliorated. This statement is based upon the other cases, and also upon the experience of others.

Neuro-Retinitis and Vitreous Opacities.—The author combined these two conditions, for he was satisfied that the latter never occurs as a distinct disease in itself, but is always associated with some other diseased condition.

I. H. Male, *æt.* 27, blacksmith.

Duration, 4 months.

Wassermann, + +.

Vision—R. E. $\frac{6}{200}$.

Treatment, 11th February to 27th May 1915.

Salvarsan, 2.

Discharged ; vision $\frac{2}{20}$ both eyes.

Wm. B. Æt. 53, painter.

Duration, 3 weeks.

Wassermann, + + + +.

Vision $\frac{20}{50}$ both eyes.

Treatment, 7th January to 23rd February 1915.

Salvarsan, 1.

Discharged; vision $\frac{20}{20}$ both eyes.

The same statement is true of neuro-retinitis as in interstitial keratitis.

A most interesting case is reported of a young woman affected since July 1915, who made no improvement under the usual treatment until American product of salvarsan was administered in February 1916.

Neuro-Retinitis with Marked Vitreous Opacities.—F. K., female. Trouble began last July. No etiology discovered. Wassermann negative. Was treated in clinic for some time with but little improvement.

15th December, vision about $\frac{20}{200}$.

Entered hospital 31st January 1916.

Vision at that time—R. $\frac{20}{100}$, L. $\frac{20}{80}$.

Vitreous very cloudy, especially the right; fundus not seen.

Patient given atropin and dionin t.i.d.

14th February 1916, vitreous had cleared, so that fundus could be seen, and a neuro-retinitis was diagnosed.

24th February, vision—R. $\frac{20}{80}$, L. $\frac{20}{70}$.

24th February, 6 grms. American salvarsan was given.

Considerable headache for first 24 hours.

26th February, vision—R. $\frac{20}{60}$, L. $\frac{20}{30-3}$.

28th February, vision—R. $\frac{20}{50-3}$, L. $\frac{20}{30-3}$.

2nd March, vision—R. $\frac{20}{40}$, L. $\frac{20}{20}$.

15th March, 6 grms. salvarsan given.

17th March, vision—R. $\frac{20}{20}$, L. $\frac{20}{20}$.

Summary.—Optic atrophy, 5—improved, 3; no results, 2.

Neuro-retinitis, 2—absolute improvement.

Interstitial keratitis, 2—improved, 2.

Paralysis of third nerve, 1—absolute improvement.

Sympathetic ophthalmia—improved; practically hopeless without salvarsan.

The author concludes by the following statement regarding the reaction:—The better results were obtained in those cases in which the injection was followed by a marked ciliary redness without pain. The reaction was noticed in cases with a negative as well as a positive Wassermann, it being true that a negative reaction is not proof

positive that specific disease does not exist. Taking, therefore, the view of the presence of spirochætes, he states that it is fair to suppose that the reaction is due to a stirring up of the spirochætes to renewed activity. Both cases shown at the meeting of the Society demonstrated this to perfection, one being interstitial keratitis with positive findings, the other, with vitreous opacities and swollen disc, had every symptom of a late specific condition, but with persistent negative Wassermann.

THE CLASSIFICATION OF THE COLOUR-BLIND.

This classification is based upon the facts of colour-blindness discovered by the writer, Dr. Edridge-Green (*The Ophthalmic Review*, January 1916), which he considers as now thoroughly established, and in many cases rediscovered by others. Since these facts were discovered entirely through the theory of colour-vision which he adopted, Dr. Green begins his article with a summary of this theory to show how it explains the facts as far as the colour-blind are concerned.

"A ray of light impinging on the retina liberates the visual purple from the rods, and a photograph is formed. The rods are concerned only with the formation and distribution of the visual purple, not with the conveyance of light impulses to the brain. The ends of the cones are stimulated through the photo-chemical decomposition of the visual purple by light, and a visual impulse is set up, which is conveyed through the optic nerve fibres to the brain. The character of the stimulus and impulse differs according to the wave-length of the light causing it. In the impulse itself we have the physiological basis of the sensation of light, and in the quality of the impulse the physiological basis of the sensation of colour. The impulse being conveyed along the optic nerve to the brain stimulates the visual centre, causing a sensation of light, and then, passing on to the colour-perceiving centre, causes a sensation of colour. But though the impulses vary in character, according to the wave-length of the light causing them, the retino-cerebral apparatus is not able to distinguish between the character of adjacent stimuli, not being sufficiently developed for the purpose. At most, seven distinct colours are seen in the spectrum, whilst others see in proportion to the development of their colour-perceiving centres only, six, five, four, three, two, or none. This causes colour-blindness, the person seeing only two or three colours instead of the normal six, putting colours together as alike which are seen by the normal-sighted to be different. In the degree of colour-blindness, just preceding total, only the colours at the extremes of the spectrum are recognised as different, the remainder of the spectrum remaining grey."

The writer contends that this theory could not be true if the facts of colour-vision were as stated in the books of twenty-five years ago.

He gives a great many predictions, which, having been fulfilled, exist as facts to prove that colour-vision is a secondarily developed power of discrimination, and believes that these present difficulties to be solved by any other theory. Colour-blindness is only an example of defective development, the sense of sight being developed first, then the sense of colour. "First, there was a colourless spectrum, then a spectrum with a tinge of red at one end, and a tinge of violet at the other; then the red and violet encroached on the white region until they met in the centre, and a fresh colour—green—was developed. In further development the red-green region was replaced by yellow, then blue replaced the violet-green region, then orange became distinguishable, and, finally, indigo. Every fact points to this being how the evolution of the colour-sense has taken place, and there are various degrees of colour-perception corresponding to every stage in the process."

Cases of colour-blindness may be divided into two classes, which are quite separate and distinct from each other, though both may be present in the same person. In the first class there is light as well as colour loss. In the second class the perception of light is the same as the normal-sighted, but there is a defect in the perception of colour. In the first class certain rays are either not perceived at all or very imperfectly. Colour-blinded individuals belonging to the second class can be arranged in series. At one end of the series are the normal-sighted, and at the other the totally colour-blind. The writer has classified the colour-blind in accordance with the number of primary colours which they see in the spectrum. If the normal-sighted be designated hexachromic, those who see five colours may be called pentachromic, those who see four tetrachromic, those who see three trichromic, those who see two dichromic, and the totally colour-blind. There are many degrees included in the dichromic class. The neutral region varies in size, being widest in those cases approaching most nearly to total colour-blindness.

The fact of this graduation of colour-perception has now been definitely recognised. Shortening of the red end or the violet end of the spectrum is a distinct defect from defective colour discrimination. A normal-sighted person, when examined with the writer's spectrometer with a bright spectrum, marks out about eighteen monochromatic divisions, those with defective colour discrimination mark out a fewer number in proportion to their defect. The dichromic see two colours in the spectrum—red and violet—with a natural division of varying size between the two colours. The trichromic see three colours in the bright spectrum—red, green, and violet. The orange and yellow regions are seen as red-green, and the blue region as green-violet. Here we have persons who have three-colour sensations who are to a certain extent colour-blind. A trichromic, in conditions of difficulty,

becomes dichromic. As the colours are further apart in the colour-blind, simultaneous contrast is increased.

The writer calls attention to the fact that many who are partially colour-blind will make matches similar to normal at one luminosity, and that a man will pass the Holmgren test with ease, and yet confuse the green and red lights with his lantern. He regards the old classification of red-blindness, green-blindness, etc., as absolutely meaningless, and asserts that of the many thousands examined by him he has not found one who could come under this classification; even with the main varieties experts of exceptional ability may diagnose them differently. In the classification given by the writer the name indicates the characteristic which applies to every member of the class; for instance, every dichromic has only two-colour sensations, and, when examined with a bright spectrum, says that he sees only two colours and a neutral region. Shortening of one or other end of the spectrum, alterations in the luminosity curve or size of the neutral region, whilst producing different varieties, do not affect the fundamental distinctions on which the classification is made. Since the classification is based only on fact it does not commit anyone with regard to theory.

A. MACG.

ANALYTICAL REPORTS.

EMETINE-BISMUTH-IODINE.

(W. MARTINDALE.)

THE treatment with emetine-bismuth-iodine was recently referred to in the *Journal*, and the arrival of a specimen of the "Stearettes" prepared by the firm of Martindale is opportune. Fully realising the unfortunate fact that emetine given by the mouth is liable to cause vomiting, Mr. Martindale has set about coating the emetine-bismuth-iodine tablets with a special coating to ensure their breaking up in the intestines rather than in the stomach. He tells us that he has been at work on this matter of intestinal medication for some years. Keratin is commonly employed for coating drugs for the purpose in question, but this is by no means successful. Keratin-coated tablets either dissolve in the stomach or may be passed entire. The "Stearettes" of the emetine compound are hence welcome, and both experiments, simulating the digestion process as also clinical trials, have proved their efficacy. They are made in 1- and 3-grain sizes. Twelve of the latter constitute a course of treatment.

SOLOID NASO-PHARYNGEAL (EUCAINE) COMPOUND.

(BURROUGHS WELLCOME & Co.)

Messrs. Burroughs Wellcome & Co. have added to their list a new soloid product, in which $\frac{1}{8}$ th of a grain of eucaine hydrochloride replaces an equivalent proportion of cocaine salt in the naso-pharyngeal compound. Powdered and dissolved in 1 to 3 ozs. of water this preparation forms an excellent gargle or spray in irritable conditions of the nose and throat. A weaker solution has been used with success in conjunctivitis.

EDINBURGH MEDICAL JOURNAL.

EDITORIAL NOTES.

Child Welfare.

DURING the past winter session the Pathological Club of Edinburgh have conducted an inquiry on the medical aspects of the Child Welfare Movement. In the next two numbers of the *Journal* we propose to publish the papers on which the discussions were based, and a summary of the general conclusions arrived at.

CASUALTIES.

DIED of wounds, Captain JAMES MACALLAN, R.A.M.C., on 9th February, aged 30.

Captain Macallan was educated at Glasgow University, where he graduated M.B., Ch.B. in 1910, subsequently filling the post of senior house-surgeon of the Royal Infirmary, Wigan. He was attached to the East Lancashire Regiment.

KILLED in action, Captain JOHN ALEXANDER HARPER, R.A.M.C., on 14th February, in France.

Captain Harper was educated at Glasgow University, where he graduated M.B., Ch.B. in 1912. He took a temporary commission in the R.A.M.C. in December 1915, and received the Military Cross on 30th March 1916 for bravery in action at Ypres. He was attached to the Yorkshire Regiment when killed.

KILLED in action, Temporary-Lieutenant CHARLES STIEBEL, I.M.S., on 2nd February, aged 40.

Lieutenant Stiebel was educated at St. Thomas' Hospital and at Trinity College, Cambridge, and took the diplomas of M.R.C.S. and L.R.C.P. (Lond.) in 1902, the M.B.(Camb.) in 1904, and the F.R.C.S.(Edin.) in 1911. He took a temporary commission in the I.M.S. on 17th November 1914, and served successively in the Kitchener Hospital at Brighton, at Alexandria, at Mudros, and in Mesopotamia.

KILLED in action, Captain JOSEPH ELLIS MILNE, D.S.O., R.A.M.C. (T.F.), in France, on 22nd February, aged 48.

Captain Milne was educated at Aberdeen University, where he graduated M.A. in 1888, M.B. and C.M. with honours in 1891, and M.D. with honours in 1894. After a short period in Liverpool he returned to Aberdeen, and was in practice there till he took a commission as lieutenant in the First Highland Casualty Clearing Station on 25th April 1915. He afterwards became medical officer to one of the battalions of the King's Liverpool Regiment (Liverpool Irish). The bravery he displayed in the battle of the Somme was recognised by the award of D.S.O. in October 1916, and he was again mentioned in Sir Douglas Haig's New Year's dispatch.

DIED on service, Dr. LAURA ELIZABETH FORSTER, on the Galician front, from heart failure following influenza.

Dr. Forster took the degree of M.D.(Berne) and the State Diploma of Switzerland in 1914, and the diploma of the Conjoint Board in Scotland in the following year. Prior to the war she was in practice in Notting Hill, London. She had been actively engaged at Petrograd and Erzerum; from there she went to Staroe Chilnoe and, later, to the Russian front in Galicia.

DIED of wounds, Captain HUGH BARR, R.A.M.C., at Salonica, on 21st February, aged 35.

Captain Barr was educated at Glasgow University, where he graduated M.B., Ch.B. in 1905. He was in practice at Alexandra, Otago, when war broke out. He returned home in 1915, and took a temporary commission in the R.A.M.C.

DIED on service, Captain GEORGE STAUNTON HUSBAND, D.S.O., I.M.S.; reported in the casualty list published on 6th March.

Captain Husband was educated at Edinburgh University, where he graduated M.B., Ch.B. in 1904, and entered the I.M.S. as lieutenant in 1907. Throughout the present war he had been serving in various theatres of war, and received the D.S.O. on 3rd June 1916.

MEDICAL STUDENTS.

DIED of wounds received in action, Second-Lieutenant WILLIAM COLSTON CRAIG, South Lancashire Regiment, on 20th January, aged 23.

Second-Lieutenant Craig was a medical student at the University of Glasgow.

DIED of wounds on 23rd January, Lieutenant N. W. STEWART, Royal Scots, attached to Royal Flying Corps.

Lieutenant Stewart was a student of science and medicine at the University of Edinburgh, where he took the first- and second-class certificates and a medal.

KILLED in action on 5th February, Lieutenant ARTHUR I. HUMPHREYS, Royal Naval Volunteer Reserve and Royal Naval Division.

Lieutenant Humphreys was a medical student at Durham and Edinburgh Universities. He had served in the Dardanelles and in France, and was killed by a shell while attending a wounded soldier.

DIED of wounds, Second-Lieutenant JAMES ROBINSON DOBSON, Royal Irish Fusiliers, on 19th February.

Second-Lieutenant Dobson was studying medicine at the Edinburgh University when war broke out. He enlisted in the Royal Scots Regiment, and served with this regiment in France until February 1916, when he received a commission in the Royal Irish Fusiliers.

KILLED in action, Surgeon-Probationer GORDON PATRICK WALKER, R.N.V.R.; reported in the casualty list published on 5th March, aged 19.

Surgeon-Probationer Walker attended the medical classes at Anderson's College and St. Mungo's College. On receiving his commission as surgeon-probationer he went to Haslar Hospital for a two months' course, and was afterwards appointed to a destroyer.

WE have been requested to publish the following inquiry:—

"I wish to establish, if possible, as a fact whether there is or is not a case of 'a woman aged 48 or over having a living or viable child,' recorded *on evidence other than the mere ipse dixit* of the woman as to her age. As the Registration of Births Act is now over fifty years old, it should be possible to get the date of parturition and the date of the mother's birth both officially recorded, and it is cases of this nature I am anxious to obtain for a forthcoming edition of Taylor's *Medical Jurisprudence*." Communications should be directed to Dr. FRED. J. SMITH, 138 Harley Street, W.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH. — The following candidates have passed the Final Dental Examination and were granted the diploma of L.D.S., R.C.S.(Edin.):—Petrus Jacobus Hugo le Roux, South Africa; William Graham Bowie, Edinburgh; Leonard Walter Blazey, London; Ulrich Oscar Gottlieb Reinecke, Orange Free State; John McCurdy, Co. Antrim; and Meindert de Villiers, South Africa.

ERRATUM.—In the article by Dr. E. F. Cyriax, which appeared in last month's issue, the illustrations should be reversed on the Plate facing p. 198.

ON FRAGILITAS OSSIUM AND ITS ASSOCIATION WITH BLUE SCLEROTICS AND OTOSCLEROSIS.

By E. BRONSON, A.B., M.D. (U.S.A.).

THE purpose of this paper is to give a description of two families with hereditary fragility of the bones associated with grey-blue sclerotics, and in the first family with otosclerosis also; a summary of the literature of these peculiarities in relation to fragilitas ossium is presented, together with a general discussion of the whole subject, case reports of the congenital type, and a bibliography.

HISTORY OF THE CURRIE FAMILY.

In December 1915 John B. (No. 37 in the diagram of the Currie family) was brought to the Royal Hospital for Sick Children, Edinburgh. While talking with the mother it was noticed that her sclerotics, as well as those of the child, were of a deep grey-blue. On inquiry a history of fractures and blue sclerotics through four generations was obtained. The great-grandfather, William Currie, was the earliest individual about whom information could be ascertained. The history was taken subsequently from each adult living in Scotland in order to ensure accuracy.

GENERATION I.

(No. 1).—William C. was reported to have been a short, slender man, much crippled. He sprained his ankles easily as a boy, but no fractures were known to have occurred until his 16th year, when he broke his thigh. During the next few years he had many fractures. He had deformed elbows and claw fingers. He always wore a belt about his hips because of pain in his back. The shape of the head is remembered by all who saw him; they describe other members of the family as having, or not having, "a head like Grandfather C." A soft spot was present as long as he lived. The frontal and occipital regions were prominent. (A daguerreotype was seen.) The sclerotics were deep blue. He had moderate deafness.

(No. 2).—A sister of William C. had fractures and deep blue sclerotics. She lived in Cumberland, and no trace of her or her descendants has been found.

GENERATION II.—*Children of William C.*

(No. 3).—Mary C. A. Several fractures of legs in youth and at least one fracture of an arm when over 30 years of age. She was said by her daughters and sisters to have had eyes and head like

William C., even having a soft spot on the top of her head throughout life. She was very deaf.

(No. 4).—Joan C. L. A large woman with sloping forehead, white sclerotics, no fractures, and normal hearing. (Photograph seen.)

(No. 5).—Annie C. W. A tall, slender woman with several fractures of the legs, but not crippled; deep blue sclerotics. Not deaf. She died at 23 years. (Photograph seen.)

(No. 6).—Elizabeth C. S. Age 49. Medium height; a woman of slender frame, somewhat crippled. She has sprained her ankles and dislocated her fingers easily since childhood. She had her first fracture, a broken leg, when 3 to 4 years of age. She has had her thighs and legs broken many times. The left leg is shortened, and a radiograph of the hip shows a fracture of the neck of the femur with resulting coxa vara. She has had fractures about both elbows, with displacement, and has claw hands apparently secondary to the deformity at the elbow. She broke her arm at 38, and had her most recent fracture, that of one leg, at 46. Her head shows a full frontal region and a prominent occipital bone; there is no supra-aural enlargement. She has very deep grey-blue sclerotics, and she has been growing deaf since adolescence.

(No. 7).—Mrs. C. H. Medium height. Fractures from early girlhood up to recently of thighs, legs, and arms; she says she has lost count of the number. She has also had many sprains. She has the characteristic full forehead and prominent occipital bone. There is some depression in the region of the posterior fontanelle. She has deep blue sclerotics, and has been somewhat deaf since girlhood.

(No. 8).—Marg. C. P. In Canada, and address unknown. Reported by sisters to have white sclerotics and no fractures.

GENERATION III.—*Grandchildren of William C.*

(*Children of No. 3—Mary C. A.*).—Nos. 9, 10, and 11 died in early infancy with no history of fractures. There were also two still-born children of whom no description can be obtained.

(No. 12).—Mrs. Joan A. B. Age 39. (See photograph with infant, also radiograph of hand (Figs. 4 and 5)). She is a short woman, with a large head, a full forehead, and a prominent occipital bone. She dislocates her thumbs easily and has sprained her ankles many times. She has had several fractures of the arms, and at present shows a deformity of both forearms near the wrists. She has the typical blue sclerotics, though the colour is not so intense as in some members of the family. She has been growing deaf for twenty years.

(No. 13).—Mrs. A. T. A well-built healthy woman with no peculiarity about the shape of head, no fractures, and white sclerotics. Hearing normal.

(No. 14).—Eliz. C. A. Age 35 years. Height 5 ft. Slender. Both legs have been broken. Her ankles are so easily sprained that she keeps them bandaged constantly. She wears a belt for sacro-iliac joint disease. Her head is very like her sister's, No. 12. She has blue sclerotics, and has been growing deaf since 16 years of age.

(*Children of No. 4*—Joan C. L.)—(Nos. 15 to 21 inclusive).—This family shows none of the characteristics of fragilitas ossium. One individual, a man of 29, has had a fracture of the arm, but from violence.

(*Children of No. 5*—Annie C. W.)—(No. 22).—Mrs. Christina W. S. is a stout, short woman with slender bones. She had broken her thigh twice before 3 years of age, and has had several fractures since then about the ankles. Her fingers dislocate easily. She walks with a decided limp, and from palpation one would judge that she had had a fracture of the neck of the femur. She has some deformity and callus of both forearms. The eyes show the darkest sclerotics of any of the family I have seen. She has somewhat defective hearing.

(*Child of No. 6*—Eliz. C. S.)—(No. 23).—Died in infancy. Deep blue sclerotics but no fractures. The mother does not know whether or not the skull was soft.

(*Children of No. 7*—Mrs. C. H.)—(Nos. 24 to 30 inclusive).—These seven have had no fractures, and their eyes are normal.

(No. 31).—A boy of 10 years. Short and rather thick-set. He has the full forehead, but more prominence of the parietal and temporal than of the occipital region. He has had two fractures of the arms, one of them recent. His sclerotics are moderately blue.

(No. 32).—A girl of 8 years. Fragile, under-sized, with the typical head. Fontanelle closed, but depressions of both anterior and posterior fontanelles as well as palpable lambdoidal sutures have persisted; no supra-aural bulging. She has already fractured her thighs twice, and has had what was either a sprain or a fracture near the ankle. The sclerotics are a very deep blue.

GENERATION IV.—*Great-grandchildren of William C.*

(*Children of No. 12*—Joan A. B.).—Of six children three died in infancy without fractures. Two of these three had blue sclerotics.

(No. 35).—A boy of 6 years. Height 39 $\frac{3}{4}$ ins. He has the typically shaped head (Fig. 1). The fontanelle is closed. He is a healthy child, has had no fractures, and shows no signs of rickets. The sclerotics are blue, of moderate intensity.

(No. 37).—A fairly healthy boy of 3 years. (Fig. 2). He has had one fracture of the right arm, caused by falling off a chair when 1 $\frac{1}{2}$ years of age. He has the same type of head as his brother. The fontanelle is closed. There is no enlargement of the costo-chondral junctions, though the chest is somewhat deformed. No enlargement



Figs. 1 and 2. —David and John B. (Nos. 35 and 37). The younger had an injury at the elbow, with resulting flexion deformity.



FIG. 3. —Elbow of Etn. C. S. (No. 6). —Injuries about the elbow with flexion deformity are common in this family.



FIG. 4.—The Hand of Mrs. Joan A. B. (No. 12). Notice the deformity at the wrist and the raveled appearance of the bones.



FIG. 5.—Mrs. Joan A. B. (No. 12) with her Child (No. 38). Notice the shape of the head in the child and the deformity of the forearm in the mother.

of the ends of the long bones, or other signs of rickets. The sclerotics are a deeper blue than those of No. 35.

(No. 38).—An infant which died of pneumonia at 11 months, while the family was being studied. The circumference of the head was $18\frac{1}{2}$ ins.; the occipital protuberance was marked (Fig. 5); the anterior, posterior, and lateral fontanelles open, not bulging, and the sutures, especially the lambdoidal, palpable; there was no craniotabes. No enlargement of the costo-chondral junctions. He was cutting teeth, sitting up alone, and trying to stand. No fractures. Moderately grey-blue sclerotics. No complete necropsy was permitted, but one eye was removed for examination. (See discussion of blue sclerotics.)

Children of Nos. 13, 15, and 16, like their parents, have had no fractures and do not show blue sclerotics.

(*Child of No. 14—Eliz. A.*)—(No. 43).—A fragile little girl of 12 years. Height $53\frac{1}{2}$ ins.; circumference of head $20\frac{1}{4}$ ins. She has had two fractures of the clavicle, of which the radiograph shows practically nothing now. She sprains her ankles so easily that they are kept bandaged like her mother's. Her head and eyes are very like her mother's (No. 14).

(*Children of No. 22—Christina W. S.*)—(No. 53).—A healthy boy with no fractures and white sclerotics. However, he is able to dislocate his fingers and toes at will.

(No. 54).—Died in early infancy. Had deep blue sclerotics.

(No. 55).—An infant 4 months old when seen. The head showed a full frontal region. Anterior, lateral, and posterior fontanelles were open widely and all sutures palpable. There were crepitant spots over the occiput. The baby was breast-fed, good-natured, and apparently healthy.

DISCUSSION OF CURRIE FAMILY.

Several subjects are suggested by a study of the preceding family history. There is a hereditary tendency (1) to fractures and dislocations; (2) to a peculiar type of head; (3) to grey-blue sclerotics; and (4) to deafness.

1. FRACTURES AND DISLOCATIONS.—The liability to fractures in this family belongs distinctly to the type described by Lobstein in 1833 as "idiopathic osteopsathyrosis." The earliest member of whom we have a history, William C. (No. 1), is reported to have had no fractures until 16 years of age, and the earliest occurrence of a fracture was in his great-grandchild (No. 37) at $1\frac{1}{2}$ years of age. That the liability to fractures continues well on into middle life in some members of this family is illustrated by Elizabeth C. S. (No. 6), who is now 49 years of age. Her first fracture was in her 4th year, and her most recent at 46—a fracture of the leg

above the ankle, produced by stamping her foot in anger. Dislocations are nearly as frequent as fractures. This tendency to dislocations and sprains was not present in any of the patients who had not fractures and blue sclerotics, except in No. 53, who can dislocate his fingers and toes at will, and yet shows none of the other peculiarities of the Currie family. No. 17, a man of 29, has had one fracture, but from violence.

It is of interest to note that in no member of this family has there been the extraordinary degree of fragility described in many of the non-familial cases or in the cases of osteogenesis imperfecta of Vrolik. Arnott's patient, a girl of 14 years of age, had thirty-one fractures, the first occurring at 3 years of age. Her sister had nine fractures between 8 months and 6 years; there was no hereditary history. In Cortes' family, where there was hereditary transmission, no fractures were mentioned in infancy, and thirteen fractures was the largest number in any individual. Pauli described three generations, and noted that no fracture occurred before the 8th year, and no large number in any person. Axhausen reported a child who was normal until the 3rd year, and then suffered from twelve fractures within a year. A brother had twenty fractures, the mother four, and an aunt several.

The fractures in family fragilitas ossium usually occur after birth and even after infancy. That there is no absolute rule is illustrated by Willard's family of three generations, one individual in which had the first fracture at birth, another at 1 week, a third at 3 weeks, and a fourth at 4 weeks. This family is also exceptional in that, though the onset of fractures was early, the maximum number of them was nine for any one person. In Pritchard's family, one infant had a fracture on the 2nd day of life, a second on the following day, and a third 3 weeks later. Such examples are exceptional. I have seen no record of family fragilitas ossium in which an infant was born with a large number of broken bones, like Chaussier's case of the osteogenesis imperfecta of Vrolik, an infant with one hundred and thirteen fractures, who died soon after birth.

In the Currie family the stature varies. The individuals affected speak of themselves as small-boned in contrast to their relations who have no fractures. Of those examined, all are below average height except Eliz. C. S. (No. 6) and Mrs. C. H. (No. 7). A photograph of Annie C. W. (No. 5) would indicate that she was above the average height. The children measured from 1 to 2 ins. less than the average for their ages (comparison was made

with the tables in Holt's *Diseases of Infancy and Childhood*), also about the same amount less than their cousins who have not fragile bones.

2. THE PECULIAR TYPE OF HEAD.—The photographs of Joan A. B. (No. 12) and her three children illustrate the shape of head seen in all members of this family who have fragility of the bones and blue sclerotics. It will be observed that the frontal and occipital bones are unusually prominent, yet there is none of the squareness of the typical rickety head. The suture boundaries of the occipital bone can be made out by palpation in the majority of the cases. If the history is to be trusted, two individuals had patent fontanelles throughout life. There is, in this family, no supra-aural bulging such as has been emphasised by Cameron in *osteogenesis imperfecta congenita*. It may be well to state that members of the Currie family without fragility of the bones have sloping foreheads and no prominence of the occipital bones.

The head of the infant (No. 38, Fig. 5) at 11 months measured 18½ ins. The lateral and posterior, as well as anterior, fontanelles were open, but there was no craniotabes. The head of No. 55, a breast-fed healthy infant of 4 months, showed all fontanelles open, and slight gaping of all the main sutures. Crepitant spots were present over the occiput.

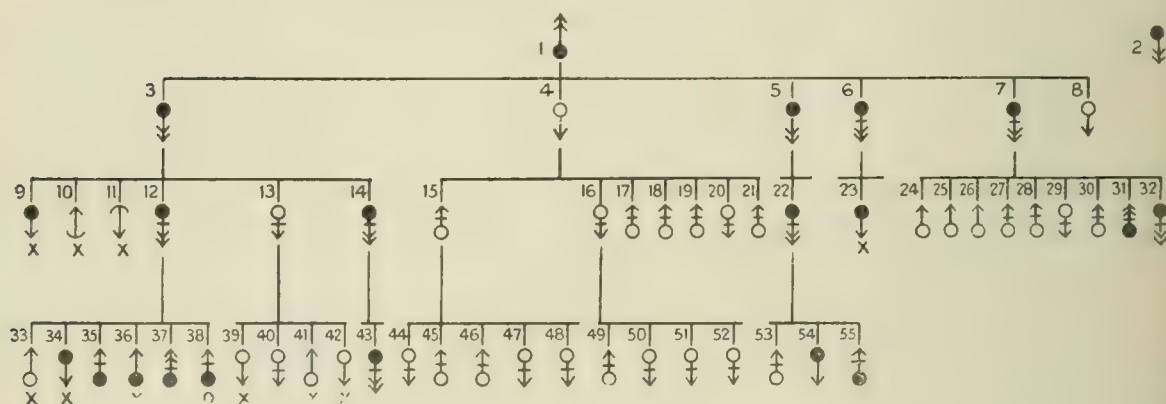
In none of the Currie family is the antero-posterior axis of the eyeball rotated downward as in hydrocephalus and as in the family of Thomas W. (see below). Schultze reports a girl of 13 years who had her first fracture at 9 months, and twenty-three fractures in all. Her photograph shows a head shaped very much like that in our family, except that the ears are bent outward by supra-aural bony prominence. In Hartmann's third case the occipital protuberance is marked and forehead full as in our cases.

The explanation of the shape of the head is probably that in infancy certain portions of the skulls of these individuals are less perfectly ossified than others, and unusual prominence of these parts results. In other words, one may say that in hereditary *fragilitas ossium* there may be present *osteogenesis imperfecta* of the skull.

3. GREY-BLUE SCLEROTICS.—The diagram (p. 246) shows the incidence of blue sclerotics in this family. It will be noted that fractures have occurred in all the persons who had blue sclerotics, and who survived infancy, with the exception of No. 35, a boy of 6 years. Individuals who did not show a tendency to fractures had ordinary sclerotics. The degree of fragility seems to correspond

with the darkness of the grey-blue colour of the sclerotic. That no such rule holds universally is evident from the limited number of fractures reported in the literature of hereditary blue sclerotics, also from the fact that the sclerotics of Alastair R., a non-hereditary case of extreme fragility of the bones (see below), were of a less deep blue than those of most of the individuals in the Currie family. Doris O. (see below) did not show the typical grey-blue sclerotics at all. That the grey-blue sclerotics are not confined to the family type of fragilitas only is evident from its presence in Alastair R., also in the cases of Herrman, Ostheimer, Coues, and E. A. Park (personal communication).

CHART 1.-THE CURRIE FAMILY.



X = Died in early infancy.

O = Died while family was under observation.

↑ ↓ = History of blue sclerotics.

↑ ↓ = History of fractures and blue sclerotics.

— Cross line indicates case was examined by the writer.

↑ ↓ = Colour of sclerotics or presence of fractures not known.

55 individuals in this family. 35 of these examined by the writer. 21 of the 55 have blue sclerotics. Of these 21, 13 had fractures, 6 died in infancy without fractures, 1 is at present an infant, and 1 is a healthy boy of 6 years with no fractures.

That grey-blue sclerotics may occur in individuals with no tendency to fractures is illustrated by the following case which Dr. Arthur Sinclair, Ophthalmologist to the Royal Hospital for Sick Children, Edinburgh, kindly referred to me:—

CASE WITH BLUE SCLEROTICS WITHOUT FRAGILITY.

Mrs. L., age 36. No children. No history of fractures or blue sclerotics in the family. (Mrs. L., her sister, and sister's children examined.)

Personal History.—She was breast-fed, walked at 1 year, and her development seems to have been normal. She had acute rheumatism at 15 years, and several attacks since; the heart was involved in the

first attack. She had one fracture, but from violence—falling down steps. The blue sclerotics were present at birth.

Examination.—Height $4\frac{1}{2}$ ft.

Head shows a full square frontal region. The general shape of similar to the head in the Currie family, but the prominence of the occipital bone is absent.

Eyes.—Deep grey-blue sclerotics. The colour is uniform. Glasses for the correction of hypermetropia are worn.

Extremities show no deformities which could be attributed to fragility of the bones.

It is evident that, apart from a slight resemblance in the shape of the head and a fracture from violence, there is nothing to correlate the blueness of the sclerotics in this case with that which occurs in certain cases of fragilitas ossium. The colour is, however, the same grey-blue which was present in the Currie family.

Dr. Arthur Sinclair kindly examined the fundi and tested the refraction in Nos. 6, 14, 37, and 43. He found no abnormality of the fundus in any of them. A varying degree of hypermetropia was present in each case, in No. 6 (age 49) combined with presbyopia. He also tested the ocular tension with Schiotz's tenometer in No. 6 and No. 14, and found it to be normal—that is, 20 mm. of mercury.

In the literature, hypermetropia, with or without astigmatism, has been noted in all cases the refraction of which was examined. The presence of embryotoxon is emphasised by Stephenson and noted by others. We found this in several of our cases, but its frequency in normal eyes causes us to attach no importance to it. The irides in our cases were of varying degrees of lead-grey. Stephenson, however, states that the colour of irides varies as well as the hair and complexion.

The Literature of Blue Sclerotics.—The incidence of blue sclerotics with fragility of bones was described first by Eddowes in 1900. Twenty years before, while in general practice, he had had as a patient a small boy with ten fractures who showed the deepest blue sclerotics he had ever seen. Hence when a girl with deep blue sclerotics came to him for examination of the eyes, he asked her if she had broken any bones, and received the history that both she and her father (who had eyes like herself) had had numerous fractures.

Peters, in 1908, reported three generations of blue sclerotics and in 1913 he made an additional note of fragility of the bones in these cases; only six fractures in three individuals, however.

Stephenson and Harman, in 1910, published accounts of the

same family of blue sclerotics, altogether fifty-five individuals in five generations, thirty-one of whom showed typical sclerotics. Neither mentioned fragility of the bones, but in 1915 Stephenson showed, at the London Ophthalmological Society, a mother and two daughters belonging to this family with fractures.

Rolleston, in 1911, reported four instances of blue sclerotics in three generations, but mentions fractures only in the third generation, a child of 9 months. In 1914 he stated that this child had had two additional fractures.

Burrows, 1911, described a family of twenty-nine individuals (four generations), thirteen with blue sclerotics, and nine of the thirteen with brittle bones.

Adair-Dighton, 1912, gave accounts of thirteen individuals in four generations; nine of these individuals had blue sclerotics, and six of the nine, fractures. The total number of fractures was only twelve.

Coues, in 1912, recorded the history of a boy of 9 years who had had nine fractures since 2 years of age. He mentioned the "slaty-blue" sclerotics, and stated that he had heard of a family on Cape Cod with similar sclerotics and fragility of bones.

Conlon, 1913, reported twenty-seven persons in five generations; eighteen of these had blue sclerotics, and, of the eighteen, those who had reached puberty had sustained fractures.

In Poynton's case, 1913, a girl of 11 years, there was no family history of either fractures or blue sclerotics. This child had had repeated fractures since early infancy, and showed, as noted by Rolleston, the typical blue sclerotics.

Cockayne showed a patient in 1914, from a family of twelve, in four generations, of which six had blue sclerotics, and all but the patient, an infant, had had fractures. No fractures had occurred in any of the family who had not blue sclerotics.

Ostheimer's case, 1914, had blue sclerotics and nine fractures between $1\frac{1}{2}$ and 4 years of age. No family history of blue sclerotics or fragility.*

* At the meeting of the Royal Society of Medicine, Section for the Study of Diseases in Children, 23rd February 1917, Dr. T. R. Whiphram showed a boy of 9 years who has had at least six fractures since 5 weeks old. Deformity of the legs was extreme. The head showed the increased bitemporal diameter and frontal prominence. The sclerotics were grey-blue but of less than the average intensity.

In 1914 Wrede showed a girl of 16 years who had had sixteen fractures since 4 years of age, and who showed the typical grey-blue sclerotics. No definite history of heredity stated.

Herrman's case, 1915, of blue sclerotics, fractured the right tibia at 20 months; then, six weeks later, while still in bed, the right femur. No family history.

The report of Salvetti's case, 1915, was not accessible.

In 1915 Hofmann reported, with brief notes, three cases:—

1. A boy with blue sclerotics had four fractures between 6 and 14 years of age. No family history given.

2. A man of 24 years of age had a fracture at 1 year and again at 24 years of age. His mother also had blue sclerotics, but no further history of fractures was given.

3. A man, aged 31, had a fracture in the first year of life and two fractures since. His brother had had ten fractures. Both showed blue sclerotics.

Dr. E. A. Park, Baltimore, in a personal communication, states that blue sclerotics are present in a case of multiple fractures which he has seen but has not published.

In going through the literature of osteogenesis imperfecta and fragilitas ossium I have not found any description of cases with blue sclerotics except those summarised above. Arnott, in 1833, spoke of the presence of "bluish-grey irides" in his cases of family fragility, but he failed to mention the sclerotics.

Etiology of the Blue Sclerotics.—The etiology of the blueness has not been determined. All writers agree that it is due to increased transmission of the colour of the choroidal pigment, not to any inherent colouring of the sclerotics. Eddowes suggested that "the transparency of the sclerotics indicated a want of quantity or quality of the fibrous tissues forming the framework of the various organs of the body, and probably explained the want of spring or toughness in the bones of these individuals." Stephenson agrees with this statement. Peters thinks there is probably an actual thinning of the sclerotics. Conlon considers an increase in transparency the more likely hypothesis, suggesting that if there were thinning of the sclera one would expect to find cases of buphthalmos in these families, or at least some evidence of axial myopia. Fridenberg, who examined the eyes in Herrman's patient, also thinks that the assumption of thinning of the sclerotic as a cause of increased colour transmission is disproved by the absence of any record of a case in which distension of the globe, as in infantile glaucoma or hydrophthalmos, was present; also, there is no mention of the presence of coloboma or posterior staphyloma. He suggests that the blue sclerotic and the lead-grey iris as well are due to a transparency dependent upon the absence of lime salts in the connective tissue elements of the sclera and iris.

Histological Examination of Blue Sclerotics.—Buchanan made a histological examination of a blue sclerotic in 1908. He found the cornea three-fifths and the sclera one-third the usual thickness. There was a decrease in the number, but no change in the size, of the sclerotic fibres. However, there is no history of fractures in this case, and one has no reason to assume that it belongs to the fragilitas—blue sclerotic group.

An infant of 11 months (No. 38 in diagram; see Fig. 5) died while the family was under investigation, and permission was obtained for the removal of one eye. Mr. Richard Muir of the Pathological Department of Edinburgh University made microscopic sections of this. These were examined by Dr. J. V. Paterson, Ophthalmologist to the Royal Infirmary, Edinburgh, who stated that the sclerotic was of normal thickness, and the size and number of fibres normal for a child of that age. Since this infant had the typical blue sclerotic the more probable theory of its etiology is that of increased translucency rather than decrease in thickness.

In regard to the frequency with which grey-blue sclerotics are associated with fragility of the bones, one cannot judge until more observations have been made. Their significance and true etiology have yet to be determined. When opportunity occurs, a quantitative chemical examination of the blue sclerotic should be made and the results compared with the normal.

4. PROGRESSIVE DEAFNESS.—Seven individuals of the Currie family have had deafness starting in early adult life and growing steadily worse. None of them has become completely deaf. No member of the family without fragilitas ossium and blue sclerotics has had any deafness. In the literature one finds two references to deafness—Dent's case, a man of 29 years, who had been growing deaf for three years; and the case of Adair-Dighton, in which nerve deafness started three months after childbirth. It is absent in the family of Thomas W., reported below.

Dr. John S. Fraser* of the Otological Department of the Royal Infirmary, Edinburgh, examined three persons with deafness and one without deafness or fragility.

1. Mrs. Eliz. S. (No. 6 in diagram).—Age 49 years. Deafness started in her teens, but has grown much worse in the past eight years. No history of otorrhœa. She has noises in her ears "like machinery." She hears better in a noise. Examination showed nose and pharynx

* Dr. Fraser expects to publish detailed notes of these cases in the *Journal of Laryngol., Rhinol., and Otol.*

normal. Bone-conduction over the mastoid was better than air-conduction. The watch was not heard by either air- or bone-conduction. Dr. Fraser's diagnosis was otosclerosis, with nerve deafness in addition.

2. Mrs. Joan B. (No. 12).—Age 39. Deafness for twenty years, most noticeable during her pregnancies. She hears best in a noise. She has whistling noises in her ears. Examination showed otosclerosis of an advanced degree.

3. Miss Eliz. A. (No. 14).—Age 35. Deafness started at 16 years of age and has gradually grown worse. No otorrhœa. She is much troubled with buzzing in the ears. Of late she has had dizzy spells. She is a mill-worker, and hears best in the noise of the mill. Examination showed otosclerosis as the cause of deafness.

4. Mrs. T. (No. 13), who has neither fragilitas ossium nor blue sclerotics, was examined and showed no defect in hearing.

Deafness associated with hereditary fragility of the bones has not been described previously. Is the deposition of calcium salts in the middle ear related to the abnormal osteogenetic processes? This possibility raises the question of excessive deposition of calcium salts in other structures of the body, as the arterial systems. In the Currie family there is no history of cerebral hæmorrhage, and the arteries of individuals examined showed no excessive sclerosis. It is most desirable that future reports of cases of fragility should make note of the presence or absence of these points.

FAMILY OF THOMAS W.

In October 1916 Winifred W. was brought to the Casualty Department of the Paddington Green Children's Hospital, London, for a fracture of the right leg. She had been treated there for a fracture of the left leg eight months previously. She showed grey-blue sclerotics. I obtained the following family history:—

GENERATION I.—(No. 1).—Thomas W. writes that he has had no fractures, but that he is considered "loose-jointed." He states that the "whites of his eyes are blue like his son's." He does not remember his parents' eyes.

GENERATION II.—(No. 2).—Thomas W., Jr., age 39 years, has had occasional fractures on slight provocation all his life. The first was of the right thigh at 4 years of age. He remembers details of a Colles' fracture of the right wrist, fractures of the ribs on three occasions (once on slipping from a chair, once from hitting against a desk at school, and once on slipping on the fender of the fireplace). He also fractured several fingers by grabbing the bridle of a horse. His last injury was a Pott's fracture one year ago. He has sprained his ankles

show temporal enlargement, so that the ears are turned slightly outward, but there is little frontal or occipital prominence. The jaw is slightly underhung. The thorax is short and thick-set. The abdomen is full and the muscles relaxed. There is no enlargement of the costochondral junctions, nor of the ends of the long bones. When the patient stands there is hyperextension of the knees and all joint ligaments show hypotonicity. She has had no fractures, but has sprained each ankle once. She has moderately deep grey-blue sclerotics.

(No. 7).—Winifred W., age $3\frac{1}{2}$ years, had her first fracture—the left leg—at $2\frac{1}{2}$ years; it recovered rapidly. No other fractures occurred until the present, an oblique fracture of the right tibia—October 1916—caused by slipping and falling. (In January 1917 she fractured her right femur just above the knee.)

She was a breast-fed infant, first tooth at 7 months, and walked at 16 months, but crawled for six months previously. She is generally healthy, except that she takes cold readily. She has had no severe illness.

Examination.—A short, thick-set child of rather apathetic disposition. Height, $31\frac{3}{4}$ ins.

Head.—Circumference, $20\frac{1}{4}$ ins. Temporal and frontal regions are full. The head is too broad for its length. The ears are bent slightly outward by the temporal enlargement. The lambdoidal suture is palpable as a ridge, yet the occipital bone is not prominent. The axis of the eyes is tilted slightly downward. The sclerotics are a moderately intense grey-blue. The jaw is slightly underhung, and almost no neck is present.

Thorax.—Short and thick-set. No rosary. The lower ribs flare outward somewhat.

Abdomen.—Large, relaxed. Abdominal muscles show poor tone. There is a small umbilical hernia. The liver is 1 in. below the costal margin; the spleen not palpable.

Respiratory and circulatory systems normal. *Glands* not enlarged. *Reflexes* normal.

Extremities.—No enlargement of the ends of the long bones. No disproportion between the arm and forearm, thigh and leg. No palpable callus of the right leg. The muscular tone is poor all over the body, and hyperextension of the joints is possible.

Digestive System.—Teeth in excellent condition. Tongue clean. Tonsils small, and pillars and pharynx not injected.

Urine examined, negative. *Von Pirquet*, negative. *Wassermann*, negative.

Radiographic plates show no marked changes in the structure of the bones. There is now, after eight months, no trace of the fracture of the left leg.

The recent fracture of the right tibia was united firmly with a moderate amount of callus in two weeks.

(No. 8).—Child of Mrs. M., died at $1\frac{2}{12}$ years, soon after a fracture of one leg. This infant had blue sclerotics like her mother.

DISCUSSION OF FAMILY OF THOMAS W.

Although the family of Thomas W. is another example of Lobstein's osteopsathyrosis, the physique of its members resembles that of Alastair R. and Doris O. (see below) more than that of the Currie family. In fact, Winifred W., when shown with Doris O. at a medical meeting, was regarded as her sister, yet Doris O. had fractures at birth, and would naturally be classed as osteogenesis imperfecta congenita. In general, the characteristics of the head in this family are a frontal and supra-aural prominence, a slight tilting downward of the axis of the eye, ears bent outward and downward, and a slightly underhung jaw. The shape of the head and palpable sutures are probably due to the same cause as in the Currie family, but are more pronounced. The grey-blue of the sclerotic is less intense than in most individuals of the Currie family. There is no history of deafness. Of especial interest is the presence of blue sclerotics and hypotonicity of joints in the grandfather, and the presence of blue sclerotics only in his daughter, yet their children had fractures.

HISTORY OF ALASTAIR R.

CASE I.

Alastair R., age $4\frac{3}{12}$ years, was attending the Surgical Out-Patient Department of the Royal Hospital for Sick Children, Edinburgh, for treatment of a fracture while the Currie family were being studied.

There was no history of fractures nor blue sclerotics in parents, grandparents, or brothers and sisters. The father is a soldier. The patient is the fifth of seven children. One of these died of pneumonia, otherwise they have been fairly healthy. The mother worked hard, doing washings up to a short time before the birth of the patient.

He was a full-time baby, the labour was easy, with delivery by a midwife. At birth he was a large, healthy-looking baby, the "finest of the seven." He was breast-fed until 6 months, then given cow's milk. At 8 to 9 months milk pudding and eggs were started, also extra cream. He was always fed better than the other children. He had his first tooth under 6 months, was creeping under 1 year, but he has never walked. He talked at 11 to 12 months. The history of illnesses has been quite negative except for an attack of diphtheria.

Special Condition—History of Fractures.—1. At birth the mother says the thighs were much swollen and bent, and that in the left there was a sharp angle. When a few days old they were put in cardboard splints, by the military doctor, and a skiagram was taken.

2. At 4 to 5 months patient broke his right thigh while being nursed by his grandmother. This was set at the Connaught Military Hospital.

3. A few months later the right thigh was broken again while his father was playing with him.

The mother noted that he often cried out in infancy when picked up. When about 1 year old he was shown to students at a London hospital, because of a soft spot on the right side of his head.

4. When $1\frac{2}{12}$ years old he was admitted to Dr. Melville Dunlop's ward in the Royal Hospital for Sick Children, Edinburgh, with a fracture of the thigh. This was treated by suspension, and he was sent home in a Thomas' splint, to be worn during the day only.

5. Fracture of right thigh soon after leaving hospital.

6. Two months later another fracture of thigh. At this time the Thomas' splints were changed to double Hamilton, in which he has been day and night since.

7. When $2\frac{9}{12}$ years of age, while in splints, he broke his leg, trying to turn over. He was admitted to the surgical ward under Mr. Stiles, with fracture of right femur. The house surgeon made the note at that time that the other bones were "very rickety."

8. Two weeks later while in extension in the ward he fractured the left femur. There was little displacement and no swelling.

9. Five weeks later, after extension was removed, he fractured his right tibia.

10. When 3 years of age—February and March 1915—he was in the surgical ward again with a fracture.

11. When nearly 4 years—November 1915—he cried out at night, and though in splints there was a fracture of the left femur, for which he was under observation when first seen by the writer.

Examination.—A somewhat pale, well-nourished, short, thick-set child of normal intelligence. Height, $32\frac{1}{2}$ ins.; weight, 27 lbs. 13 ozs.

Head.—Circumference, $21\frac{1}{4}$ ins. The fontanelles are closed, but there are depressions still at the regions of the anterior and lateral fontanelles. The occipital bone is slightly raised beyond the level of the rest of the skull, and its margins are easily outlined. The frontal region is full, but not square like a rickety head. There are no supra-aural bony prominences. On the right temporo-parietal region is a depression in the bone $1\frac{1}{2}$ by $\frac{3}{4}$ in.

Eyes.—The iris is a deep bluish-grey. There is a slight embryotoxon. The sclerotics are a uniform grey-blue of moderate intensity.

Neck.—Is short, and jaw somewhat underhung.

Spine.—Shows lower dorsal curvature of the weak-back type. The patient sits up if placed in upright position, but seems unable to pull himself up.

Thorax.—Short and broad. An angle and easily movable joint is present at the junction of the manubrium and xiphoid process. There is no enlargement of the costo-chondral junctions.

Abdomen.—No distension and natural looking. Neither liver nor spleen are palpable.

Circulation and respiratory systems show nothing abnormal.

Nervous System.—Deep tendon reflexes are somewhat exaggerated, and slight facial irritability is present.

Digestive System.—No abnormality. Teeth good.

Glands.—No groups even palpable.

Extremities.—There is little, if any, disproportion between the length of distal and proximal long bones. There is no enlargement of the ends of the long bones. There is deformity and callus of former fracture just above right wrist. (The mother does not recall any fracture in this place.) The thighs and lower third of the tibiæ show marked anterior bowing. The feet lie in complete extension, with toes in same plane as the tibiæ. Hyperflexion, however, is not possible, actively or passively. Lateral movements of the feet are greater than normal. Nearly all joints show hypotension. He is a dead weight to handle, the shoulders slip through one's hands, and legs hang limp from body. He uses his arms somewhat, but can raise his feet only 6 to 8 ins.

Urine.—Clear, acid. No excess of phosphates. Sugar, albumen, indican, negative. Sediment, negative.

Blood.—Hb, 80 per cent.; R. B. C., 5,952,000; W. B. C., 10,100; P. M. N., 60 per cent.; P. M. E., 1 per cent.; S. M. N., 29 per cent.; L. M. N., 10 per cent.

Von Pirquet, negative. *Wassermann*, slightly positive.

Ophthalmoscopic examination by Dr. A. H. Sinclair showed nothing abnormal.

Treatment.—This patient has been under treatment with emulsion of cod-liver oil and phosphorus most of his life. He was in the Royal Infirmary, Edinburgh, for six weeks—in February and March 1916. After discharge, the mother, at my advice, left off the double Hamilton splints. Two weeks later, while reaching for something, he broke his right tibia. In the early summer he had another fracture of left leg. In August, he was still without splints, crawling about the floor. There was noticeable improvement in his muscle tone.

Summary.—Case I.—Alastair R. is an example of non-familial fragility of the bone associated with blue sclerotics. The onset was at birth or previously, yet the skull does not show signs of any extreme grade of imperfect osteogenesis. The long bones are



FIG. 6.—Alastair R., Case I. Notice that there is no marked bilateral enlargement of the head, also the short, thick-set body with no disproportionate shortening of the long bones.



FIG. 7—Pelvis of Alastair R., Case I. Observe the poor shadow cast by the bone, the slenderness, bending, and scars of many fractures of the long bones, also the coxa vera and shape of pelvis.

most affected, with at least fourteen fractures without violence. The trunk is short and thick-set, and extremities are not disproportionately short. The skiagrams show slender bowed bones, with little callus at points of fractures. All the bones are much rarefied.

HISTORY OF DORIS O.

CASE II.

Doris O., age 4 years, has been under the observation of Dr. Leonard Guthrie * at the Out-patient Department of the Paddington Green Children's Hospital for the past five months.

Family History.—Negative. Patient is the only child. Full-time, breast-fed infant. First tooth at 9 months. Talked early. No illnesses, and considered generally healthy.

Special Condition.—At birth the legs were twisted at right angles to the body. The nurse attempted to straighten them, but because they continued crooked, at the fifth week they were put in splints by the doctor. Thereafter splints were kept on day and night. No fractures were noted by the mother until the 18th month, when the child cried on being bathed, and the thigh was found broken. At 2 years an unsuccessful attempt was made to teach the child to stand. At $3\frac{3}{12}$ years the right arm was broken. Five months ago, under the direction of Mr. Lees, Assistant-Surgeon of the Paddington Green Children's Hospital, the child began to stand, and later to walk, supported under the arms by a harness. She is walking short distances without aid now, but shows marked hypotonicity of the knees and ankles.

Examination.—A short, thick-set, well-nourished child of normal intelligence. Height, $30\frac{7}{8}$ ins.

Head.—Large. Circumference, $20\frac{1}{4}$ ins. Not square like a rickety head. The bitemporal diameter is very noticeably increased; this supra-aural enlargement bending the ears slightly outward and downward. The occipital bone is also prominent. The fontanelles are closed. The axis of the eyes is not tilted downward. The jaw is slightly underhung. The sclerotics show a slight blue tinge, but not more than one frequently sees in normal children.

Thorax.—Bilateral diameter increased, giving a short, thick-set body. There is some enlargement of the costo-chondral junctions, and Harrison's groove is present.

Abdomen.—Large, relaxed; muscle tone poor. Liver 1 in. below costal margin. Spleen not palpable.

Heart and lungs negative.

Glands.—No general enlargement. Thyroid gland is palpable.

* I am indebted to Dr. Guthrie for the privilege of taking the history and examining this patient.

Extremities.—Some enlargement of ends of long bones. Marked angular deformity of the right arm. Anterior bowing of tibiæ. In this child the proximal bones of the extremities are disproportionately short to the distal bones. Skiagrams show marked bowing of the extremities, scars of many fractures, with little remaining callus, and a structure of bone similar to Alastair R., except that the long bones are shorter and thicker than his.

Summary.—Doris O., Case II., like Alastair R., Case I., is an instance of fragility of the bones, with fractures at birth or previously in a child surviving infancy. She differs from Case I., in the somewhat shorter, thicker long bones, the disproportion between their proximal and distal portions, and in the much more marked abnormality in the shape of the head.

HISTORY OF PETER MCN.*

CASE III.

Father and mother are healthy. No miscarriages. There were nine children. The first child was a 7-months infant, and died at 3 weeks of age. The patient was the second child. One of the seven remaining children died of whooping-cough, the others are healthy. No fractures in the family.

Normal birth, and a strong baby, though two weeks premature. Breast-fed three weeks, then cow's milk.

He had his first tooth at 2½ months. He was reported to have had his full first set at 9 months. He walked at 2 years. The "opening of his head" did not close until he was over 18 months old.

Except for breaking bones he has been a healthy child. He has always been very thin.

Special Condition.—Fractures—(1) Left femur at 3 years, by falling down two steps of a staircase. (2) Left clavicle at 3½ years, by falling from a small barrow. (3) Right femur broken and knee dislocated at 4 years. (4) Right clavicle at 5 years, by falling down steps. (5) Right femur at 9 years, by a slight fall.

There was no history of sprains or dislocations except the right knee. This knee is fixed in partial flexion, also the elbows. At the wrists an unusual degree of passive lateral movement is permitted and crepitation is elicited. There was no pain nor tenderness. The stature is normal, and there is no disproportion between the lengths of proximal and distal long bones. The joints appear enlarged, but the absence of pain and tenderness is against any arthritis. (Bruck and Anschütz

* This boy was under Mr Caird's treatment at the Royal Infirmary, Edinburgh. Permission was obtained from him by Prof. Lorrain Smith for me to see this patient



Fig. 9. Doris O., Case II. Notice the short, thick humerus in contrast to the long, slender ulna and radius.



Fig. 8. Doris O., Case II.

both describe a joint disease, associated with fragility of the bones. In Bruck's case the joints went on to ankylosis, while there was distinct improvement in the fragility. In Anschütz a synovial arthritis was present. In these cases one regards the joint involvement as coincident.)

The head of Peter McN. resembles that of the Currie family rather than Alastair R. or Doris O. There is a full but not square frontal region. The bitemporal diameter is not increased. The occipital bone is prominent, irregularly bossed, and the sutures about it are palpable as depressions. The eyes do not show typical blue sclerotics. There is no depression of the bridge of the nose, and nothing about the boy's appearance to suggest congenital syphilis.

Summary.—Peter McN. illustrates an isolated case of bone fragility starting after infancy. Like the family cases reported above, a certain amount of violence is needed to produce the fractures. His sclerotics are not the typical blue. The shape of his head is very similar to that of the Currie family, and the supposition is that there was a degree of osteogenesis imperfecta in his earlier development. There is no dwarfing.

GENERAL DISCUSSION.

Terminology.—Although Lobstein used the term Osteopsathyrosis to denote the idiopathic as well as other types of bone fragility, and Vrolik, in 1849, described the prenatal idiopathic type under the term Osteogenesis Imperfecta, "Fœtal Rickets" was formerly the usual designation of a group of conditions including Osteogenesis Imperfecta, Achondroplasia, and Cretinism. In 1878 Parrot described Achondroplasia, and 1892 Kaufmann definitely separated this condition from the group under the name of Chondrodystrophia fœtalis. Cretinism is now also a clinical entity, and even in 1861 was separated clinically from Osteogenesis Imperfecta by Heckel. As early as 1889 Stilling, in a careful report of a case of prenatal Osteogenesis Imperfecta, suggested that so loose a term as "Fœtal Rickets" was superfluous. Other names occur: Kundrat speaks of Osteoporosis congenita, Hochsinger of Osteopsathyrosis fœtalis, Bamberg and Huldshinsky of Osteopsathyrosis congenita, Marchand of Congenital Osteomalacia, Klebs of Periosteal Dysplasia, Looser of Osteogenesis, congenita and tarda. *Fragilitas Ossium* is one of the terms most frequently used.

What is the most suitable name depends partly on whether it is considered that there are two distinct conditions—one prenatal,

affecting the skull and causing a large number of fractures in all bones; the other postnatal, and affecting chiefly the long bones—or whether we accept the pathological identification of the two types, and regard them as degrees of intensity of the same pathological process.

Etiology of Bone Fragility.—In regard to the etiology of bone fragility the only factor we know is heredity, and this occurs, according to Ostheimer, in only 9·8 per cent. of cases, though there is a history of affected brothers or sisters in as many as 29·6 per cent. The inheritance, when present, is direct transmission—what Bateson calls “knight’s move,” namely, the characteristic of fragility is a dominant one. Davenport thinks the condition of blue sclerotics is also a dominant one, but he is not certain that the two are linked. The line of transmission is not through females to males, as Greenish and, later, Harman suggest.

Syphilis is not a factor. The thyroid gland was examined and no pathological lesion found by Stilling, John, Ballantyne, Michel, Dieterle, and Sumita. Occasional reference is found to overwork or poor physical condition of the mothers, but more often both parents were healthy. Ostheimer considers that there is some fault in the metabolism of the mother. Zesas emphasises the lack of some internal secretion. Klose also suggests that the endocrin glands are concerned, quoting Cushing’s finding, that the posterior lobe of the pituitary gland has an influence on the metabolism of calcium and magnesium. Von Recklinghausen’s suggestion, which Sumita revised, that there is a fundamental malformation or a “vitium primæ formationis” of the bone-forming cells, is a satisfactory expression of our ignorance.

Clinical Picture and Gross Pathology.—In Osteogenesis Imperfecta of prenatal onset the typical description is that of an undersized, frequently premature, infant, either still-born or dying soon after birth. The extremities are short and thick-set; the diaphyses irregular, with rings of callus, and circumference increases in proportion to the size of the epiphyses. The head is a crepitant bag with only a mosaic of small plates for a bony covering.

Shape of the Head.—The shape of the head has been noted since the condition was first described, and the term “hydrocephalic” most frequently applied to it. The erroneous conclusions which may follow such a use of the word hydrocephalic are illustrated by Esser’s suggestion that the etiology of the fractures is of central nervous origin, some trophic disturbance as

syringomyelia and tabes, probably the result of a pachymeningitis, which may be assumed by the frequent presence of hydrocephalus. The softness of the skull accounts, in all probability, for the early death of most of the typical congenital cases. In the infants that survive birth, yet have defective ossification of the skull, the ultimate shape of the head will depend upon what portions yield most readily to pressure. This process is illustrated well by Preiswerk's case, an infant with deformed legs at birth (fractures when seen at fifth day by a doctor) and a head like a crepitant bag. At 2 months the skull was much harder, but deformed, and at 2 years of age there was marked bilateral enlargement, with ears bent outwards and downwards, and a full frontal region. Another similar instance is Bamberg and Huldshinsky's second case. At 2 months of age the skull was soft, and the fontanelle measured 7 by 5.5 cm., yet the head was not especially abnormal in shape. When 2½ years of age, however, there was marked bitemporal enlargement and turning out of the ears. It should be noted, however, that though the head was very similar to Preiswerk's case, the first fracture of the long bones was on the eighth day of life, not before birth. The bitemporal enlargement in Ewald's second case was very striking, and in this instance the fontanelle was open—not bulging—until 4 years of age, though no fracture of long bones occurred until the seventh month. In Scheib's case a similar deformity, with ears turned out, was present at birth, and the skull showed only a moderate degree of defective ossification, suggesting that this deformity is not necessarily of postnatal origin. Harbitz speaks of the cranium of his patient—an infant dying a few minutes after birth—as a sack, yet he adds that there was nothing hydrocephalic nor unusual in the size and shape of the head. The question arises whether or not this child would have developed an abnormally shaped head if it had lived.

The bitemporal enlargement was emphasised by Cameron as characteristic of congenital *Osteogenesis Imperfecta*. That it is not limited to cases dying in infancy, nor to those having fractures at birth, is illustrated by the cases of Ewald, Nathan, Schabad, Lunge, and others. My Case II. shows this characteristic, and it may even be present in family fragility of bones, as illustrated by the family of William W. That it is not an essential feature even of the cases with fractures before birth is shown by Lovett and Nichol's patient, who had a normally hard skull at birth, without deformities, yet had fractures. In Fowler's case the

entire skull was soft at 4 days of age—the time of the first fracture. When 1 year of age the back of the skull was ossified; at 2 years the anterior fontanelle was $\frac{3}{4}$ in. across. Simon's patient, a girl of 13, who had had ten fractures, with the first at birth, still had a depressed, soft posterior fontanelle. Nathan's case showed open sutures and movable cranial bones at 17 years. In my cases of the Currie family there is a history of patent fontanelle throughout life in two individuals.

Enough has been said to indicate that, while a bilateral increase in diameter is of frequent occurrence, no single characteristic in the shape of the head is pathognomonic in the diagnosis of Osteogenesis Imperfecta congenita, also that the so-called typical head of the congenital type is found in certain cases with fractures of postnatal onset, and even in hereditary Fragilitas Ossium. On the other hand, it is reasonable to expect the greatest cranial defects in infants with intra-uterine fractures. The cases cited indicate that in certain instances there is a selective process, so that some portions of the bony frame escape while others are markedly involved.

An increase in the size of the head is frequently mentioned. In my opinion the apparent size and the actual increase in occipito-frontal circumference is due usually to an abnormal arrangement of diameters, but the total volume of the head is the same. Preiswerk mentions huge callus formation on the skull in his case. This is a possible explanation of increase in size, if present. Except in Dillenburger's case of associated pachymeningitis, there is no history of bulging fontanelles nor other signs of hydrocephalus.

An underhung jaw was mentioned by Cameron. This showed in several photographs from the literature, and was slightly present in our cases,—Alastair R., No. I., and Doris O., No. II., and in Winifred W. of the family of William W.

Blue Sclerotics.—The blue sclerotics, as present in Alastair R., have been noted in non-familial cases by Herrman, Ostheimer, Poynton, Cones, Hofmann, and E. A. Park. (Personal communication.) Their frequency is unknown.

Stature.—The short stature has been mentioned from the earliest descriptions in the literature, especially of the prenatal type. A disproportionate shortness of the proximal to the distal long bones has been also noted occasionally. That short stature must not be assumed an essential characteristic was maintained by Vrolik, Bidder, S. Müller, Sumita, Fuchs, Lovett and Nichols,

Frangenheim, and others. Maier attempted to distinguish between the prenatal and postnatal type by the length of the long bones as revealed by radiographic plates. He believed that short, thick bones were characteristic of the former, and long, thin bones of the latter. No such universal rule can be formulated, yet, in general, one may say that the earlier the onset of symptoms of imperfect osteogenesis, the greater will be the effect on the stature. However, short stature is not confined to cases with fractures before birth, as illustrated by Willard's family and my cases, the Currie family, and family of William W. Also that slender bones and short stature are not incompatible is shown by Case I. above. Griffith's case, which fractured on the second day of life, was a normal-sized child; also Maier's patient, a girl of 6 years, with many fractures since $1\frac{1}{2}$ years, was not stunted. Miura's case was similar though there had been seventeen fractures.

The theories to explain the shortening when present are—

1. That it is due to deformity, the result of many fractures. This supposition does not explain the shortening in cases like Stilling's, where the skull was like paper, yet only a few fractures of the long bones; nor cases like Fuchs' and Scharlau's, in which no fractures were found at necropsy, yet marked shortening and an extreme grade of *Osteogenesis Imperfecta* were present.

2. Fuchs suggested that the shortening depends on whether or not the endochondral bone-formation is especially affected, that is, there may be a specificity in the region of the osteogenetic processes involved. Should the endochondral ossification be adequate for the normal growth in length, but the subperiosteal be deficient, the bones would not be shortened, but would be very thin. If, however, the endochondral bone-formation were especially defective, with the subperiosteal less so, the length of the diaphyses would be diminished. In the latter case, if circumference of the diaphyses were increased, this might be due either to a diminution in osteoclasts or to excessive, but abnormal, subperiosteal bone-formation.

If one accepts Fuchs' theory, the observation that the shortening is usually most marked in cases with intra-uterine fractures is explained by the preponderance in the long bones of endochondral to subperiosteal bone in foetal life as compared with adult bone, which is almost entirely of subperiosteal origin. On the other hand, since all osteoblasts are derived from the primordial connective tissue of osteogenetic layer of the periosteum

(Piersol, and Bailey and Miller), one must explain why the osteoblasts passing centrally into the preliminary cartilage calcination zone should differ in functional capacity from those lying under the periosteum. It would become necessary to define even the stage in their development at which osteoblasts become functionally incapable of laying down normal bone.

3. The supposition of defective cartilaginous proliferation, as in achondroplasia, is not supported by pathological findings.

Fractures.—The earlier the onset of fractures the greater the liability is the general rule. The prenatal cases dying at birth often have an extremely large number, as in Chaussier's case of one hundred and thirteen. Blanchard reported a woman of 27 years with forty-one fractures since 2 months of age. In the family cases the onset is usually after infancy and the number less, yet in Pritchard's family one individual had a fracture the second day of life, and in Willard's family at birth. One member of the Currie family had her first fracture at 4, and her most recent at 46 years. In some instances the liability to fracture decreases with age. Graham's patient had eighteen fractures between 1½ and 15 years, then at 30 years had had no more. Possibly the inheritance of only a mild tendency to fracture is dependent upon the fact that badly crippled individuals are not so likely to reproduce themselves.

The absence of pain at the time of fracture is often emphasised. The probable explanation of this is the diminished amount of trauma to the soft tissues.

Union is usually rapid. The amount of callus may be excessive, as in Matsuoka's case of postnatal onset. Many of the prenatal cases showed excessive callus in a ring-like arrangement, as emphasised by Cameron. On the other hand, Lewy's patient with fractures at birth showed no callus, and the line of fractures was barely visible in radiographs. In Cases I. and II. given above there is little callus. In my case, Winnie W., of the family of William W., eight months after the accident the line of fracture could not be detected in the radiograph.

The most frequent location of fractures in individuals surviving birth is in the lower extremities, and in the thighs more than in the legs. In still-born children the ribs often show many fractures. However, there is no universal site of election to fractures. Fractures of the vertebral column and of the pelvic and shoulder girdles have been described in addition to all long bones.

Dislocations.—The tendency to sprains and dislocations was described by Velpeau in 1847, and has been noted frequently since. Hypotonicity of the joint ligaments is mentioned in congenital as well as delayed types. An exceedingly thin fibrous periosteum was described by Axhausen and Dieterle. Muscle atrophy is frequent, but can be explained by disuse. The electrical reaction of degeneration was obtained by Larat, but this was contradicted by Miura, Bookman, and Zesas, who found the reaction that of inactivity atrophy.

Comparison with Osteomalacia.—In regard to the resemblance of some cases of idiopathic fragility of bones to Osteomalacia, Doering's patient, male, 15 years of age, is of interest. He walked at 10 months and was healthy until 4 years of age, when he began to have fractures, twenty-two in all. The long bones were much bowed, though at the time of the report rigid and brittle. The pelvic ring was compressed, and acetabula were deep in the pelvis. To explain these facts Doering assumed that at some time there must have been present an abnormal softness of the bones. Similarly in Ewald's patient with twenty-five fractures between 2 and 14 years there was an osteomalacial shape of pelvis. Enderlen's case is classified as senile Osteomalacia by Looser and others. Rehn's case is discussed by von Recklinghausen, who is uncertain whether to classify it as Osteomalacia or Osteogenesis Imperfecta. Axhausen thinks that early Osteomalacia is the groundwork of all Idiopathic Osteopsathyrosis. He describes three patients, the first an example of typical hereditary Osteopsathyrosis; the second a fairly typical case of Osteomalacia starting at puberty; and the third (summarised under pathology) seems undoubtedly Osteopsathyrosis, clinically and pathologically. In my cases of the Currie family I obtained no history of difficulty in childbirth, which one would expect in the osteomalacial type of pelvis. No gynecological examinations were made.

Clinical Classification.—The classification of infants as Fuchs', with defective cranial ossification yet no fractures, as instances of Osteogenesis Imperfecta seems to be generally accepted among modern writers. However, after infancy, if the abnormal shape of head, with possibly stunted growth, is the only means of identification we have, diagnosis is impossible. Similarly a case like the one Biggs reports, with twenty-two fractures without known etiology between 20 and 30 years of age, is difficult to classify. Lovett and Nichols say that it is not possible to diagnose a case

as Osteogenesis Imperfecta (they use this term to designate pre- and post-natal onset of fractures) if the first fracture occurred late. In the absence of pathological evidence it is not known how late the first fracture may occur. I agree with this opinion, with the exception of familial and hereditary cases. In these, fractures without violence starting late in one individual must be considered as the same type as those starting earlier in relatives.

Summary.—The classical type of the Osteogenesis Imperfecta of Vrolik is a stunted infant, still-born or dying soon after birth, and showing defective ossification of the skull, and many fractures of the ribs and long bones. If the infant lives, lines of pressure acting on the soft skull produce an abnormally-shaped head. Since a similar type of head is found in certain instances of post-natal onsets of fractures, so-called Idiopathic Fragilitas Ossium or Osteopsathyrosis; in these cases also it is reasonable to suppose that there has been imperfect prenatal osteogenesis. Ossification of the skull may be nearly normal, yet the extremities show many fractures, and the reverse is true. The length of the long bones may or may not be affected, but the earlier the onset of signs of osteogenetic defect, the greater the shortening is likely to be. Hypotonicity of joints with dislocations occur. The number of fractures is, generally speaking, parallel with the earliness of the onset.

PATHOLOGICAL CHEMISTRY.

Few metabolic or chemical studies have been made. Verneuil in three patients and Blanchard and Rehn in their cases found phosphates increased in the urine.

Bookman, 1911, found relatively enormous losses in calcium and increased retention of sulphur, nitrogen, and phosphorus. These were the same results as McCrudden obtained in Osteomalacia, and the history, age, and rapid wasting, with death, make one doubt if this case were Fragilitas Ossium of the idiopathic type. Three years later, however, Bookman reported metabolic results of two six-day periods, on a 10-weeks-old infant with Osteogenesis Imperfecta. Taking the normal for that age from Orgler's work, he found calcium retention below normal in the first period and increased in the second, when calcium lactate had been added to the food.

Swartz and Bass, 1913, report nitrogen, phosphorus, and fat-retention normal, magnesium increased, and calcium slightly

decreased in an infant weighing 7 lbs. 8 ozs., which had many fractures at birth.

Bamberg and Huldshinsky in the same year recorded a variation in calcium metabolism from a loss of 0.019 grms. without treatment to a gain of 0.136 grms. under treatment with emulsion of cod-liver oil. However, as this child subsequently developed rickets, this cannot be taken as an example of benefit of treatment with emulsion in *Osteogenesis Imperfecta*.

Schabad, 1914, published the results of twelve periods of six days each of metabolic tests extending over $2\frac{1}{2}$ years on a child 7 years of age at the beginning of the study. This child had had twelve fractures. At least one week of rest was allowed between the tests, and the food kept approximately the same throughout the experiments. His conclusion was that there was increased loss of calcium in *Osteogenesis Imperfecta*. The loss of phosphorus was parallel with that of calcium. The distribution of phosphorus was physiological: that is, urine phosphorus was greater than fecal phosphorus, while in active rickets the opposite condition is noted. He tried therapeutics with (1) Phosphorus with emulsion of cod-liver oil; (2) the same plus calcium acetate; (3) emulsion plus thyroid extract; (4) iodothylin; (5) arsenic; (6) hypophyseal extract. Of these, phosphorus with cod-liver oil had the most beneficial effect on the retention of calcium. Hypophyseal extract showed a similar result, but the fact that a fracture occurred during its use did not speak in its favour clinically. Clinically, however, emulsion has had little effect on the condition. The use of thyroid extract actually decreased the retention of calcium. This result does not favour thyroid as a therapeutic agent.

MICROSCOPIC PATHOLOGY.

Cases with Postnatal Onset of Fractures.—Of the postnatal types of fragility of bone, the only careful histological examinations found in the literature were those of Looser, Doering, Axhausen (Case III.), and Hagenbach.* Axhausen preferred to class his case as juvenile *Osteomalacia* though the clinical history and radiographic appearance of the bones would indicate that it belonged to our group. He admitted that the microscopic findings tallied almost exactly with those of Looser's case.

* One does not consider Enderlen's case, a man of 61 years with six fractures of femora after he was 54 years of age, as belonging to this group. Hawards, in a brief report of examinations of bone removed from his case at osteotomy, found no microscopical changes.

Looser's patient was a 17-year old young man who had had forty-three fractures, forty of them in the legs, since $1\frac{1}{2}$ years of age. A 6-year old brother was also a bone-breaker. An amputation was performed because of the deformity, and a histological examination made. In this instance the length of the bone was normal, but showed either a high degree of atrophy or a decreased growth in circumference. The epiphyseal cartilages were normal, as was also bone formation within them, though decreased in intensity. The bone marrow appeared unchanged, and only in places where there had been mechanical injury, as fractures and infractions, was it fibrous. No fatty changes were noted. His essential finding was an insufficient functioning of all bone-forming cells, both of periosteum and bone marrow. In normal conditions a limited number of osteoblasts produced enough bone; in this condition abundant osteoblasts laid down insufficient bone. Reabsorption by osteoclasts went on as usual. With the decrease in the formation of lamellar bone by osteoblasts there was associated a varying degree of direct calcination of cartilage cells, and their persistence, in contrast to their becoming shrivelled up and disappearing in front of the advancing osteogenetic tissue, as in normal ossification. The bone built thus by metaplasia lacked the strength of lamellar arrangement and was crumbling in character.

Doering's case, a 15-year old boy who had had twenty-two fractures between 4 and 15 years of age, resembled Looser's clinically and pathologically. Examination was made of bone removed at an osteotomy of the left tibia. He emphasised the abnormal shape and size of the osteoblasts. He, however, thought that there was an increased resorption of subperiosteal bone.

Axhausen examined an amputated leg from a boy of 16 years, so deformed he could not walk, who had had many fractures of the lower extremities. The bones were slender, cortex thin and soft. The microscopic findings agreed with Looser.

Hagenbach's case was a somewhat dwarfed woman who died at 45 years of age of hypophyseal tumour. The history is incomplete, but a hospital note made when she was 6 years old stated that she was not walking and was very rickety. She had had many fractures. The microscopic examination of the bones seems to place this case in the same category as Looser's.

Cases with Prenatal Onset of Fractures.—The pathology of the prenatal type of fragility has been much more minutely studied than the postnatal type. The fact that many of this class are

stillborn or die soon after birth furnishes the reason. The first microscopic examination was made by Professor E. Wagner on J. Schmidt's case. Other early examinations were by Bidder, Fisher, Stilling, Buday. More recent careful reports have been made by Scheib, Harbitz, Michel, Hildebrandt, Dieterle, Fuchs, Sumita, Niklas, and others.

Harbitz reported the histology of a 4 to 5 weeks' premature infant dying a few minutes after birth. The bones were short and thick, with many fractures. The head was a mosaic of small thin bones, many of which were broken. The proliferating zone at the epiphyseal-diaphyseal border in the long bones was normal in form, number, and arrangement of cells. The proliferating cartilaginous calcination zone was regular. The primary medullary canal was formed as usual. The great irregularity came in bone formation, both enchondral and periosteal. The bone plates or spicules were few in number, far apart, irregularly arranged, and often in islands without proper union. No lamellar system nor Haversian canals existed. Osteoblasts were present in usual numbers but were abnormal in appearance. Osteoclasts were not increased. Harbitz thought a certain amount of calcification took place directly in the capsules of cartilage cells, metaplasia instead of neoplasia.

Scheib's patient was a full-time infant born with rather short, bowed, and thickened extremities. The head was large, especially in the bitemporal diameter, and the photograph showed the ears bent out and down by supra-aural bossing. All fontanelles were open, but otherwise ossification of the skull was not defective macroscopically. At 2 months the weight was 3300 grms. Death was at 3 months from intercurrent infection. There was no history of fractures while under observation. At necropsy fractures of the long bones and ribs, with much callus, were found. Microscopically the preparatory ossification processes were normal, but the laying down of new bone by osteoblasts was deficient, and resorption of newly-formed bone increased. Bony trabeculae were slender or absent, and in contrast were found large spaces filled with osteoclasts. The marrow was gelatinous and fatty. Similar abnormalities were found in periosteal bone formation. The callus was more strongly formed, mostly of periosteal origin, but showing also metaplastic bone changes from cartilage.

In Lovett and Nichols' case there were fractures of both thighs and both legs at birth, also a healed fracture of right thigh, yet the bones of the skull were normally hard and sutures no wider than usual. The shape of the head was normal. The

legs were short in proportion to trunk. Ten fractures occurred up to the 5th month of life and none thereafter. Death took place at 10th month from acute diarrhœa. They emphasised the presence of normal preliminary bone-forming processes, a deficiency of osteoblasts, and abnormality in the structure of these. Cartilage cells persisted, their capsules did not rupture, and direct calcification took place. True bony trabeculæ were deficient; lamellar structure and Haversian canals were lacking. Subperiosteal osteoblasts were in places abundant, but more spindle-shaped than normal. The marrow was myxomatous. Reabsorption by osteoclasts was not excessive.

Unfortunately no careful histological examinations of cases with fractures at birth which lived beyond infancy, as our patients Cases I. and II., have been made. The same is true of instances of defective skulls at birth but postnatal onset of fractures, as Nathan's Case II. This boy, aged 15 years, had had thirty-five fractures between 3 weeks and 15 years, and according to the history a very soft head at birth. His photograph showed the increased bitemporal diameter with ears turned outward and downward, which Cameron emphasised as characteristic of true *Osteogenesis Imperfecta*. Another instance where a microscopic examination might be instructive, is Ewald's—Case II.—a stunted child of 10 years with large skull, and ears bent out. She had an open fontanelle and palpable sutures until 6 years of age, and had had ten or eleven fractures since 7 months. I have not found any histological examination of a case in which heredity was a factor, though Looser's patient had a brother similarly affected.

In going through the literature the pathological point upon which there was agreement was the presence of an abnormal structure and functioning of the osteoblasts. A deficiency in number was recorded by Michel, John, Stilling, Scholz, Frangenheim, Porak and Duranti, Dieterle and Fuchs. Others, as Looser, Doering, and Harbitz, found the number not decreased, and Buday reported an increase, yet all agreed about functional disturbance. Rarely, as in Scheib's and Dieterle's cases, was there an increase in osteoclasts. Buday, Stilling, Looser, and the majority of others found them normal.

In regard to the marrow, opinion was most divergent. Michel S. Muller, Fuchs, Stilling, Hildebrandt and Frangenheim considered the amount increased, the marrow cavity large with thin shell of cortical bone. Scheib and Bidder found the marrow fatty; Nichols, myxomatous. Buday reported the marrow in places

fibrous, again gelatinous. Dieterle, Ziegler, Harbitz, and Sumita agreed that the original eruption of marrow capillaries into cartilage tissue was normal, but later the marrow became hyperæmic, poorly cellular (Dieterle found the cells abnormal but not decreased), and fibrous. In the neighbourhood of the marrow blood-supply, Buday, Hildebrandt, Michel, and Sumita found homogeneous masses of tissue, which seemed to be eliminated by giant cell resorption. Looser described similar tissue near cartilaginous callus formation in his adult case. Sumita studied the staining properties and discussed this tissue in detail, but was unable to explain its origin. Though frequently there have been reported obvious defects in the marrow, in support of the supposition that the marrow framework is not the underlying defect in causing bone fragility is the fact that in many cases the bones of the skull in which there is no marrow are especially involved.

Metaplasia, or the direct transformation of cartilaginous tissue into bone tissue, is described by Scholtz, Scheib, Harbitz, Dieterle, Sumita, and others. Scheib thought metaplastic ossification partly compensatory for the deficiency in osteoblasts. Dieterle was not certain that metaplasia was an essential lesion, since it was not unreasonable to suppose that such mechanical damage as fractures might upset osteogenetic processes and metaplasia result. This view was strengthened by one finding the most frequent mention of metaplasia in connection with callus formation; on the other hand, metaplasia is not reported in the formation of callus in normal individuals.

All writers agreed that the epiphyseal-diaphyseal border was normal, and most writers spoke of the cartilaginous basis of the long bones as normal. Buday and Fuchs found some narrowing of the cartilaginous proliferating zone.

Pathological Classification.—Looser identified his adult case of bone fragility by the similarity of pathological findings with Osteogenesis Imperfecta Congenita, using the term “Tarda” for the individuals with postnatal onset of fractures. His definition of the condition was a defective enchondral and periosteal bone formation, involving insufficient functioning of the osteoblasts both enchondral and periosteal, while the preliminary calcination of cartilage and the resorption of bone were normal. In contrast to this view, von Recklinghausen insisted that there were two separate conditions, and states the following as essential to the diagnosis of Osteogenesis Imperfecta:—

1. The presence of numerous fractures and infractions.

2. The intra-uterine onset and the continuance of the same into earliest childhood.
3. The existence of structural changes in the bones which would account for the spontaneous character of the fractures.

Thus he would classify as *Osteogenesis Imperfecta* an infant with fractures at birth, but an infant with fracture on the second day of life and frequently thereafter, as Pritchard's family case and Griffiths' isolated case, he would call *Idiopathic Osteopsathyrosis*. Such a division is obviously too empirical. I have quoted pathological notes on adults, a premature child dying soon after birth, a full-time infant dying at 3 months, and an infant dying at 10 months. The pathology of the infants with fractures before birth was similar to that of the adults, yet because of the absence of careful pathological reports on the border line cases one must admit that the last word has not been said in regard to the identification of the two groups.

Summary.—*Idiopathic Fragilitas Ossium*, whether of pre- or post-natal onset of symptoms, shows a deficient functional activity of the osteoblasts whether these have to do with subperiosteal or enchondral ossification. The preliminary ossification processes are normal. In regard to any primary abnormality in the marrow or in the function of the osteoclasts there is no general agreement. Metaplasia is frequent, but is probably compensatory, not primary in character.

Treatment.—There is at present no known rational treatment. Most of the infants and young children have been given emulsion of cod-liver oil and phosphorus. Clinically, as regards fractures there has been no beneficial result. Thyroid extract has been tried frequently. One questions the advisability of the constant application of splints to prevent fracture, because of the extreme atrophy of the bone and muscles which results. As noted above under Mr. Lees' Case II., Doris O. was taken from splints and gradually taught to stand, then walk by the use of a harness supporting her shoulders. She has been under treatment with both emulsion of cod-liver oil and thyroid extract. The use of the latter, according to Schabad, increases the loss of calcium from the body. A difficulty in gauging the effect of any therapeutic agent is the fact that the liability to fractures often decreases spontaneously.

SUMMARY OF THE MAIN FACTS OF THE TWO FAMILIES.

1. In the *first family*, consisting of fifty-five individuals in four generations, twenty-one had grey-blue sclerotics.

2. Of these twenty-one, only one, a 6-year-old boy, who survived infancy, has had no fractures. The number of fractures in any individual is not excessive, and they require a certain amount of force for their production. Sprains and dislocations are also common. The majority of adults are in good general health, and are able to do ordinary work. The mortality among infants with blue sclerotics is in this family greater than among those not affected.

3. The heads of those individuals in this family who have blue sclerotics and bone fragility show an abnormal prominence of the frontal and occipital bones. In two of them there is a history of patency of the fontanelle throughout life.

4. Of eight adults with blue sclerotics and fractures, seven had varying degrees of deafness, the eighth died at 23 without deafness.

5. In the *second family*, consisting of eight individuals in three generations, seven have blue sclerotics, and four of these have had fractures, two others have a tendency to sprains. All are able to lead an ordinary life, except one child, who is somewhat crippled and incurs fractures too easily to be able to run and play.

6. In this family the head has the characteristic shape frequently seen in *Osteogenesis Imperfecta congenita*, namely, increase in the bitemporal diameter, so that the ears are turned outward and downward, slight downward tilting of the axis of the eyes, and an underhung lower jaw.

7. There is no tendency as in the first family to deafness, nor is there any to arterial sclerosis.

8. In both families the stature of the affected individuals is below the average, with the exception of three members of the first family.

SUMMARY OF ISOLATED CASES AND GENERAL DISCUSSION.

1. Cases I. and II. are fairly typical examples of *Osteogenesis Imperfecta* of prenatal onset. They both have had numerous fractures without violence since birth, and both show signs of imperfect ossification of the cranial bones. Case III. illustrates fragility of the bones of postnatal onset, but a shape of head which also suggests softness in earlier life of the cranial bones.

2. The terminology is varied. Probably Looser's terms—Osteogenesis Imperfecta Congenita and Osteogenesis Imperfecta Tarda—are the most satisfactory.

3. The etiology is unknown. The hereditary factor is present in only a limited number of cases.

4. Clinically the condition is characterised by defective cranial ossification and by numerous fractures without violence. The earlier the onset the greater is the liability to fracture. Dislocations also occur. Blue sclerotics may or may not be associated.

5. A limited number of metabolic studies indicates an increased loss of calcium.

6. In both prenatal and postnatal onset of symptoms pathological findings indicate a deficient functional activity of the osteoblasts. In respect to other abnormalities writers disagree.

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CLINICAL RECORDS.

TWO CASES OF CONGENITAL SUPERIOR RADIO-ULNAR SYNOSTOSIS.

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PROBABLY not such an uncommon condition as might be thought, but still of sufficient rarity to merit report, radio-ulnar synostosis takes its place among the congenital deformities. One of the best and concise, as it is one of the most lucid, expositions of the subject is a paper by Wilkie,¹ in which he records three cases that had come under his own observation. Though existence of the condition has been known for more than a century it is natural that in recent years the application of radiography should have resulted in a considerable addition to the number of cases hitherto recorded.

In the two cases which have come under my notice there is a striking similarity in the defect occurring in otherwise vastly different subjects.

CASE I.—A. F. C., a lad of 19, recently consulted me on account of inability to supinate the forearms, a defect which had existed, he said, since birth. His father is well. His mother died at the age of 40 of Bright's disease. Three brothers and two sisters are well, and, according to patient, present no abnormality. His facies has a some-

what Mongolian type, but the cranium is well formed and the occiput not flat. The palate is broad and not high; the tongue is normal; his limbs well developed. As he stands, with his forearms flexed at the elbows, the palms look towards each other, and the radial borders of the forearms are directed upwards, the ulnar borders downwards. From this position there is absolutely no pronation or supination. The elbow joints are normal in shape and movement, as also are the wrist joints, digital joints, and phalanges. There appears in the forearms and hands to be no muscular defect or abnormality. The lad is a bookbinder to trade, perfectly intelligent, and quite an average scholar. Indeed, he presents no abnormality, mentally or physically, other than the inability to pronate and supinate his forearms. The head of the radius cannot be felt, but the upper part of the shaft seems to pass forwards towards or below his coronoid process of the ulna. In manually examining the superior radio-ulnar articulation one must bear in mind how much the recognition of the head of the radius depends on its rotation in the lesser sigmoid cavity while one pronates and supinates the forearms; and though in this case the radial head cannot be distinguished there is no defect to be made out in that position, nor is there any suggestion that the capitellum of the humerus is abnormal. The radiogram shows a fusion between the radius and ulna in the upper inch and half or thereby (Fig. 1), while antero-posteriorly the humeral outline in the joint appears to be normal. Thus investigation with X-rays confirms the digital examination that the capitellum is not involved. The radiogram of the lower radio-ulnar articulation shows a normal condition in every way and there is no fusion between the bones there. Apparently the shafts of the radius and ulna below the fusion are also normal.

CASE II.—G. L., aged 4 years, born of British parents in the colonies. He is the second of three—an older sister and a younger brother being healthy and normal children. The parents are well. His mother is insistent that her period of gestation lasted ten months. There was nothing, however, unusual about the birth, and the child appeared to be normal, but an hour or two after birth took a severe fit, and from that she dates his peculiarities of development. He was late in walking and very late in talking, and is now obviously mentally deficient. Physically he is fairly developed. He is restless and talkative, devoid of shyness, and articulates so badly that a stranger cannot understand what he says. He has tight epicanthic folds, that on the right being more marked than on the left. He has narrow anterior nares and a high palate and an underhung lower jaw. He has some facial paralysis of the left side, so that when he opens his mouth the lips on the left side droop. There is some paresis of the left orbicularis oris. The left pinna is rather smaller, and the concha is larger and more simple than on the right. He has a curious warty rash on the face, and pink erythematous hands. He walks downstairs like an infant, and does not

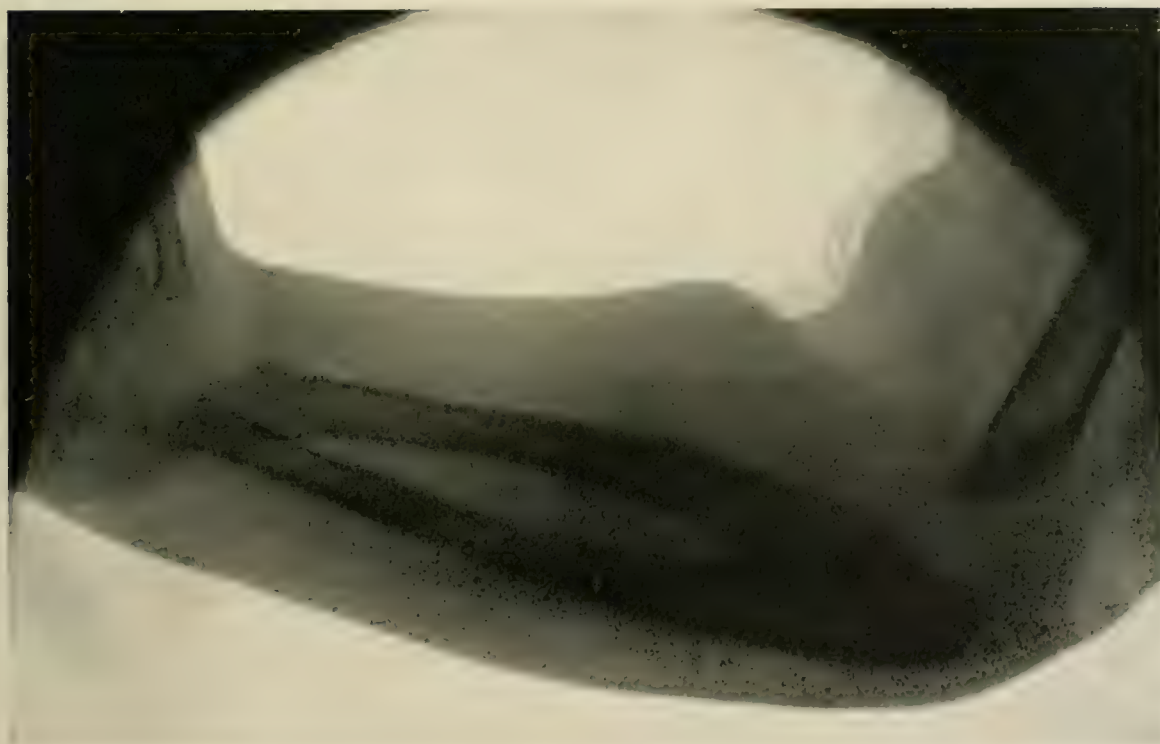
CONGENITAL RADIO-ULNAR SYNOSTOSIS.

FIG. 1.



CASE I. Male, aet. 19 years.

FIG. 2.



CASE II. Male, aet. 1 years.

seem to use his left leg as he does his right. Both forearms are fixed midway between pronation and supination, and any deviation from this position cannot be effected. The radiogram (Fig. 2) shows fusion at the upper extremity of the radius and ulna, while the lower radio-ulnar articulations appear normal.

I do not know of any record of fusion occurring in the lower end of radius and ulna apart from traumatism, and this is what would be expected, for in the foetus the lower ends of the bones are distinct and apart long before there is any differentiation between the bones at their upper extremities. The fusion is essentially an arrest of development. The forearms are formed in a position midway between pronation and supination, and from the cartilage which is to form the bones the two processes shoot down separately, with the growth of the forearm, from the single mass which in normal development becomes later on separated into the upper ends of the radius and ulna. The condition is not exactly "fusion" of the proximal epiphysis, it is a want of the splitting of the original mass into the two parts which form the superior radio-ulnar joint.

The diminution in movement is eked out by rotation of the humerus, but, even with that, of course the palm can never be turned directly upwards, and the defect is one of considerable embarrassment therefore to its possessor. A case of this kind was shown by Cotterill² to the Edinburgh Medico-Chirurgical Society in 1893, and recently cases have been reported by Hornung,³ Martin du Pan,⁴ Adams,⁵ Baisch,⁶ Maass,⁷ Mouchet,⁸ and Clarke.⁹ There is practically no variation in these papers in the type of the deformity. The conditions present an extraordinary similarity. Some years ago, while radiographing a simple linear fracture of the tibia immediately after its causation by direct violence, I found the tibia and fibula to be joined by a narrow band of bone which passed obliquely across the interosseous space between the two bones. There is no reason why such a deformity should not exist between the radius and ulna, and it would be sufficient cause for absence of pronation and supination, but it must be a condition of greater rarity than superior radio-ulnar synostosis, and it would be more amenable to surgical treatment.

Wilkie deprecates operation, at least in the cases he saw, and an attempt at a plastic operation is recorded by Clarke, though the want of success is very apparent. The mental deficiency in my second patient precluded any thought of operation. In my first patient I made an attempt to separate the proximal ends of the

radius and ulna in the left forearm by exposing the osseous mass and endeavouring to divide it vertically with a chisel preparatory to further operative treatment, but I found it exceedingly difficult to get the fracture to occur in the line I wished, and when it became deflected forwards, and merely produced a fracture of the osseous mass from behind forwards without producing a separation of the two bones, I decided to leave matters alone and not to press the attempt at improvement.

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LAPAROTOMY UNDER LOCAL ANÆSTHESIA.

By JAMES M. GRAHAM.

IN acute abdominal cases it is sometimes difficult to decide whether the patient has sufficient reserve strength to stand the necessary operation. This problem arose in a case of persistent vomiting in a patient on whom a posterior gastro-enterostomy had been performed, three and a half years previously, for the relief of a duodenal ulcer.

The patient, a man, 49 years of age, was admitted to Ward 13 in the Royal Infirmary on the 16th September 1915, in a state of collapse.

The original operation had been performed elsewhere on 5th March 1912, and from the first the patient had been troubled with occasional bilious vomiting and had never felt well. For two months before his admission vomiting had been much more frequent, and the patient had lost weight. During the forty-eight hours prior to admission the vomiting had been practically incessant and associated with cramp-like pains in the stomach.

As a result of prolonged vomiting and inability to absorb fluids or nourishment of any kind the patient was reduced to a state of extreme collapse, the body being effectively drained of all its surplus fluids. He was cold and pinched, and the lips were slightly blue. Mentally he was clear, but the voice was weak and hoarse. The temperature was 96° F. and the pulse was not perceptible at the wrist. The serious condition of the patient was further indicated by the presence of cramp-like pains in the limbs, and by the fact that for forty-eight hours he had passed no urine, the bladder containing only a few ounces.

At the commencement of the acute symptoms the vomited material was a bilious fluid, dark green in colour; but as the vomiting continued, the amount of bile pigment was reduced, and the fluid was finally only faintly tinged with bile. The contents of the stomach were practically odourless, and there was nothing to suggest butyric acid fermentation.

On examination the abdomen was found to be hollow and retracted. There was no visible peristalsis, and the abdominal wall was relaxed.

From the history and general condition it was obvious that there was a complete obstruction to the outflow of the gastric contents.

An attempt was made to relieve the urgent symptoms by washing out the stomach and by the administration of rectal and subcutaneous salines, but with only temporary benefit. The pulse for a short time became perceptible, but the vomiting recurred and it was apparent that unless further measures were taken the patient could not recover.

On account of the exhausted condition of the patient a laparotomy did not hold out much prospect of success, as it was apparent that a slight degree of shock would not be compatible with recovery. For this reason a local anæsthetic was preferred to general anæsthesia, as it was thought that, if successfully employed, the patient would be less disturbed and have more chance of rallying in the critical hours immediately after the operation. Satisfactory anæsthesia was obtained with 1 per cent. novocain, to which a few minims of adrenalin solution were added. Just before the operation a hypodermic injection of one-sixth of a grain of morphia was given.

Operation.—In the absence of subcutaneous fat it was possible to infiltrate the line of the skin incision and the anterior sheath of the rectus before incising the skin through the former scar, which

was placed above the umbilicus a short distance to the right of the middle line. After dividing the skin the infiltration of the rectus sheath was completed, the rectus muscle and the aponeurosis towards the middle line being infiltrated widely. The rectus muscle was then retracted outwards and the posterior layer of the sheath and the peritoneum were infiltrated in turn. Having opened the peritoneal cavity, care was taken to infiltrate the peritoneum and posterior sheath of the rectus over a considerable area on either side of the wound by inserting the needle at right angles. A few peritoneal adhesions were also infiltrated and divided, and portions of adherent omentum were ligated. The abdomen was thus opened without the patient suffering any pain, and the muscles were relaxed so that the subsequent steps of the operation were facilitated. At this point there was some trouble from vomiting; the stomach was therefore emptied by passing a stomach tube, of which the patient was tolerant by past experience. During all the steps of the operation the patient was conscious and able to converse, but suffered little discomfort, precautions being taken to handle the parts gently and to avoid stretching or pulling upon the parietes.

The small intestine was empty and contracted, and this fact rendered the necessary manipulations much easier. The pyloric region was too fixed by adhesions to be explored, and accordingly the region of the gastro-enterostomy was exposed by raising upwards the great omentum and transverse colon.

A sharp kink was found immediately distal to the gastro-enterostomy opening, the two limbs of the short jejunal loop forming the anastomosis lying parallel and fixed together by light adhesions. The jejunum also, just beyond the opening, was somewhat rotated and fixed in that position. By dividing the adhesions the kink was modified and the opening between stomach and jejunum was then identified and found to be large and sufficient to admit the tips of three fingers. Whether the stomach had emptied itself by the pylorus or by the gastro-enterostomy opening before the onset of acute symptoms, the angulation of the jejunum was such that the drainage of the stomach by both routes seemed liable to be obstructed.

In order to avoid a recurrence of the condition and to provide a free outlet for the bile from the duodenum a lateral anastomosis, 1 in. in length, was made without clamps between the ascending and descending limbs of the jejunal loop. The gastro-enterostomy opening being placed about 3 ins. beyond the duodeno-jejunal

junction, sufficient intestine was available on the proximal side to make an anastomosis without much difficulty.

Before completing the suture of the lateral junction an opportunity was taken to administer fluid nourishment by passing a rubber catheter down the jejunum for some inches. In this way, as after a gastrostomy, a pint of sterile water with a little brandy was introduced by means of a funnel. The suturing was then completed and the abdominal wall closed in layers.

Although the condition was still serious at the conclusion of the operation there was no indication of further shock, and after his return to bed he was able to swallow and retain large quantities of fluids in addition to what he received by rectal salines. The condition of collapse was steadily recovered from, and although the patient vomited on two or three occasions he was able to take solid food on the fifth day after operation. The wound healed without suppuration, and the patient regained weight and strength. When last seen, fifteen months after operation, he weighed 12 st. 4 lbs., having gained 4 st. in weight since leaving hospital; at the same time he stated that he was entirely free from dyspeptic troubles, and was enjoying better health than he had done since his youth.

The conditions which proved favourable for the employment of local anæsthesia in this case were the emaciated condition of the patient, the empty and contracted state of the intestines and the absence of peritonitis and of any necessity for a wide exploration of the abdomen.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

W. T. RITCHIE, M.D., EDWIN MATTHEW, M.D., J. D. COMRIE, M.D.,
AND A. GOODALL, M.D.

TWO SLEEPERS.

VERGER (*Gaz. Hebdom. des Sciences Médicales de Bordeaux*, 28th January 1917) reports two interesting cases of prolonged sleep which differed greatly in their symptoms. The first was an infantry soldier, aged 31, an actor in private life. He had never suffered from any important illness to the knowledge of his wife or parents. On the 6th of September 1914, in the course of the battle of the Marne, he was

reported missing. On the 10th of September he was admitted to hospital as one of a convoy. There was no evidence of a wound, and the only information available about him was the diagnosis of "traumatic aphasia." He came under Verger's care on 20th June 1916. He presented all the appearances of natural sleep, and it was at first possible, by putting him on his feet and supporting his arms, to get him to walk without waking him. Throughout the month during which he was observed there was little change. The eyes were closed, with a constant tremor, and the face retained its ordinary colour. Respirations were 20 to 24 per minute, abdominal in type. Pulse 96 to 110. Temperature normal. There was no increased muscular tone and no tendency to catalepsy. He made the same response to stimulation as an ordinary sleeper. He changed the position of the head. He moved his limbs from time to time, so that it was impossible to keep a urinal in position. Pinches, pin-pricks, and such stimuli elicited feeble defensive movements without interrupting his sleep, but light and noise elicited no response. All the reflexes, cutaneous and deep, were normal. It was impossible to examine the iris reflex, as he turned up the globe whenever the eye was opened. All the organic functions were performed normally. He was easily fed. The introduction of a tube between his lips set up the movements of deglutition, but it was not possible to administer anything but liquid nourishment. He passed urine every three hours and defæcated once daily. It was usually possible to arrange that this function could be performed without soiling the bed. He maintained a condition of some stoutness and even fair muscularity. The urinary output was about the usual, and there was no abnormal constituent. He never uttered any sound and never gave any indication that he might be dreaming. All attempts to wake him were vain. Chloroform had no effect except to induce sickness. Powerful electrical stimulation did not elicit more than slight movements, and he continued to sleep peaceably. He was discharged on 26th July, but, in spite of their promise, his family have not given any further news concerning him.

The second case was entirely different. He was a man of 28, antecedents unknown, who had suffered from typhoid at the Dardanelles in August 1915. He was sent home convalescent. In France he became mentally enfeebled, and was admitted to hospital on 21st December 1915. He was then in a state of profound prostration. The eyes were closed, the teeth clenched, and he showed no reactions to sensory stimulation. He had no fever, and the pulse was 72. He was fed artificially, and was transferred to a neurological department in February 1916. He then showed the aspect of a sleeping person. The eyes were closed, but the eyelids showed tremor. The jaws were closed; the face was peaceful; the limbs were lax, but showed a feeble tendency to retain any given position. He rested absolutely immobile. He reacted to no sensory stimulation. Respirations were

10 to 12 per minute, feeble and usually regular, but occasionally there was Cheyne-Stokes rhythm. The pulse-rate rose from 75 to 90 at these times. The tendon reflexes were feeble and soon disappeared. Feeding was very difficult on account of the impossibility of separating the jaws. Sometimes he was fed by a tube passed behind the teeth, sometimes by the nasal tube. In the former case deglutition was performed normally. Vomiting was frequently induced, and a curious point was that it was best treated by altering the diet. No one form of nourishment was tolerated for longer than a week at a time.

Micturition was performed at intervals. On account of the patient's lethargy it was easy to arrange to keep him dry. The bowels moved at long intervals, and, as a rule, only after enemata. The patient remained in the same condition till September, but reached an extreme degree of emaciation. All the bones of the pelvis could easily be felt, and the muscles had shrunk to the form of elastic cords. They continued to react normally to mechanical and electrical stimulation to the very end. At first sight the man looked more like a corpse than a sleeping person. It required close attention to see the feeble respiratory movements, and latterly the tremor of the eyelids was intermittent and slight. One sign of life persisted to the end. This was the changing colour of the face, which flushed very readily and rapidly when he was disturbed by noise or manipulation. It was never possible to obtain any vasomotor response elsewhere. On 1st September 1916 he made movements of the arms about 2 P.M., and at 5 P.M. he opened his eyes without appearing to see anything. He remained insensible to cutaneous stimulation and the reflexes were totally abolished. In the evening he had copious diarrhoea. The respirations became more ample and frequent and the pulse-rate rose to 80. During the night he began to speak. His first words were to demand rum. Then he complained of cold and of pain in the head and buttocks. The latter by this time hardly existed, and the discomfort was probably due to pressure on the ischial tuberosities. From this time onward the awakened sleeper was in a condition of cardiac collapse, with imperceptible pulse, pinched features, cold cyanotic extremities, and rectal temperature of 36° C. From time to time there appeared on the abdomen and thorax discrete purpuric patches over large areas. The face remained a good colour. He showed no astonishment on awaking, and only spoke to request rum or coffee, which he drank easily. He asked for his father, and showed some irritation with a sister, from whom he demanded a poultice. He answered questions in monosyllables, and it was impossible to say at what point he had completely awakened. He died on 2nd September. An autopsy showed a complete disappearance of fat, retraction of intestines due to inanition, and a remarkable diminution in the volume of the heart.

Only one point in common was present in the two cases. This was

the state of sleep. The first case had all the appearance of normal sleep, except for its duration and invincible character. It might be regarded as a hysterical condition, and a romancer might suggest that it was a means of escape from impossible surroundings to a new world.

The lowering of all organic functions in the second case suggested a total suppression of cerebral functions and indicated an analogy with the hibernation of certain animals. If the first case was an example of hysteria, the second was not. It was a condition, probably toxic, in which the digestive, circulatory, and glandular functions were reduced to a minimum. The diarrhoea which preceded awakening was perhaps a sort of toxic discharge. From the time it occurred it was easy to foretell the fatal outcome.

JAUNDICE OF INFECTIVE ORIGIN.

Bertrand Dawson and Hume (*Quart. Journ. Med.*, January 1917, x.) discuss a series of 178 cases admitted to military hospitals in France. The majority of jaundice cases could be classified as spirochætal, enteric, and catarrhal.

The first group corresponds to a condition described by Japanese writers. This has been shown to be caused by a spirochæte (*spirochaetosis icterohæmorrhagica*) which can be obtained from the blood and urine of patients, and the blood of patients causes jaundice in guinea-pigs. Spirochætal jaundice may be severe or mild. The severe cases begin gradually or suddenly. The gradual onset is manifested by malaise, faintness, headache, anorexia, nausea, and sometimes vomiting. The sudden onset takes the form of shivering, headache, pains, and prostration. The temperature at the time of reporting sick was usually 102° or 103° F. There was lassitude, prostration, and pains. The conjunctivæ were injected, and herpes about the lips was often noticed. Jaundice appeared from the second to the seventh day, usually the fourth. It appeared first in the conjunctivæ and rapidly spread over the trunk and limbs. A dirty tongue and anorexia was the rule. Constipation was present, the stools being small scybalous masses, often clay coloured. There was often abdominal tenderness. Hæmorrhages were common: these were hæmatemesis, hæmoptysis, epistaxis, melæna, and purpura. The skin showed herpes and jaundice and a curious purple discoloration on the abdomen, loins, and chest. The liver was often enlarged and tender. The spleen was rarely enlarged. The lymph nodes were sometimes shotty. The urine contained large quantities of bile, and there was generally albumen and sometimes casts. The urine became free from albumen within three weeks in the cases which recovered. Muscular pains, frontal headache, and aching behind the eyeballs were common. Convulsions preceded coma in two fatal

cases. The pulse-rate was slow in proportion to the temperature, the blood-pressure was normal. There was some anæmia, and a polymorph leucocytosis over 10,000 was the rule. The fragility of the red corpuscles showed no change. The temperature usually rose at first to about 103°. After seven to eight days it had reached normal and remained 80° for four or five days. In several cases there was a secondary fever lasting seven or eight days. Convalescence was usual at the end of three weeks, but even then the temperature tended to swing between 97° and 99° F. The mild cases were well in a week or ten days.

The chief pathological lesion was a great congestion of the duodenum, with swelling of the ampulla. The bile was very viscid.

The jaundice is not regarded as an important cause of the toxic symptoms, and probably jaundice, though a usual, is not a necessary, manifestation of spirochaetal disease. It is regretted that the Japanese workers have perpetuated the name "Weil's disease." The condition had been described by French authors before the appearance of Weil's paper, and the features described by Weil do not correspond closely with spirochaetal jaundice.

Enteric Jaundice.—The incidence of jaundice in enteric in this campaign has been larger than in many collections of cases. This may be explained by the fact that paratyphoid accounts for most of the cases, and such cases may have been previously regarded as "catarrhal" jaundice. The jaundice showed every degree of severity. Headache and vomiting were common early symptoms. The lower blood-pressure, the agglutination tests, and the atropin test were useful diagnostic aids. The latter test was introduced by Marris, who found that while an injection of $\frac{1}{50}$ to $\frac{1}{40}$ gr. of atropin sulphate increases the rate of the heart in a healthy person by about 20 to 25 beats per minute after an interval of fifteen to twenty minutes, no such increase follows during the course of typhoid or paratyphoid. This failure to escape from vagus inhibition is most marked between the eighth and fifteenth days of the disease. Leucopenia cannot be depended on as evidence of enteric. It is probably only present at the beginning of the disease and is not constant. Herpes labialis is in favour of spirochaetosis. Inoculation of guinea-pigs with about 5 c.c. of blood, if taken before the fifth day, is a useful diagnostic measure for spirochaetosis. The spirochaetes are found in the deposit of the urine after washing and staining by Fontana's method.

Catarrhal Jaundice.—This condition has all the features of an infection. The term is a convenient one to describe a jaundice in which the infective agent has not been discovered. The usual symptoms are headache, lassitude, mild transitory fever, discomfort in the upper abdomen, nausea, and vomiting. The jaundice appears later, and no doubt the infection can exist without the jaundice.

The common conditions which might be confused with the above

groups before jaundice appears are influenza, trench fever, and tetragenus infection.

Influenza is rare in the Expeditionary Force, and is seldom present without catarrh. Trench fever cannot be diagnosed till the leg pains are present and the temperature charts are seen. Tetragenus infection, if alone, lasts only three or four days. A. G.

SURGERY.

UNDER THE CHARGE OF

J. W. STRUTHERS, F.R.C.S., D. P. D. WILKIE, F.R.C.S.,
AND JAMES M. GRAHAM, F.R.C.S.

THE REMOVAL OF STONES FROM THE KIDNEY.

W. J. MAYO (*Surg., Gynec., and Obstet.*, January 1917) describes the results obtained and the methods employed in a series of 450 patients operated on for stone in the kidney. The mortality from all causes was 0·6 per cent., three patients dying out of a total of 484 operations performed in the Mayo Clinic from January 1898 to December 1915. This low mortality is due, according to Mayo, to the painstaking care with which the diagnoses were made, the function of the kidney estimated, and the patients prepared for operation, rather than to the purely technical procedures employed in operating. The presence of the stones was shown by an X-ray plate. By means of the pyelogram the urologist can say with certainty whether the stone is in the pelvis, calyx, or parenchyma of the kidney. In two cases, before the use of the pyelogram, the shadows cast by calculi in the gall-bladder were mistaken for stones in the right kidney.

Stones in both Kidneys.—In 9·9 per cent. of the cases there were stones in both kidneys. A kidney containing small movable stones is more liable to exacerbations of infection, resulting from temporary obstruction, than a kidney containing large stones, which, because of their fixed condition, are less likely to interfere with the outflow of urine. Unless the condition in the opposite kidney is acute, it is advisable to remove the stone from the least involved kidney first, and to operate on the second kidney ten or fourteen days later. Occasionally the second kidney has considerable function, even when it contains a large branched stone. The removal of such a stone is liable to cause such lacerations to the already damaged kidney that nephrectomy is often required. For this reason Mayo frequently advises against operation on the second kidney unless symptoms necessitating it arise. In exactly half of the cases the second kidney was pyonephrotic and nephrectomy was performed.

Stones with Renal Anomaly.—In three cases stones were found in a

single kidney and in two instances in a horseshoe kidney. In one case of horseshoe kidney the stone had caused a pyonephrosis in the left half, which was successfully removed. Renal stones were found in two patients with duplication of the renal pelvis.

Recurrence of Calculi.—Stones rarely re-form in the remaining kidney after removal of one kidney by nephrectomy. This occurred only twice in the series. Mayo has been greatly impressed with the fact that some patients can maintain both life and working power with what amounts to not more than half a normal kidney. One patient required removal of calculi on three occasions from a single badly damaged kidney, the other having been previously removed; on all occasions the patient had symptoms of uræmia but recovered sufficiently to return to work after the operations.

Multiple stones in the parenchyma of the kidney are specially prone to recur, but this type of case is fortunately not common.

Recurrence is specially liable to occur after removal of large branched stones from a damaged and infected kidney, and the tendency is in these cases to do a nephrectomy if the remaining kidney is sound.

If both kidneys are seriously affected it is necessary to save them both. After removal of the stones the pelvis of the kidney should be drained by a rubber tube through the cortex, and each calyx containing a stone, which has caused atrophy of the parenchyma towards the surface, should be drained separately through a counter puncture. Drainage will correct the infection and allow the cavities to contract. Rubber tubes and tissue are preferable to gauze, as the latter increases the risk of fistula. The calices should be drained by small cigarette drains.

Recurrence is also favoured by attempting to remove the stones through a limited incision, as the stone is liable to be crushed and fragments may remain. The number of stones cannot always be estimated by the X-ray shadows, as several stones may be superimposed.

If good judgment is used in selecting the forms of operation, re-formation of calculi will occur in less than 10 per cent. of the cases.

Operative Procedures.—Sepsis in the wound is rarely introduced from without and is generally due to soiling of the surfaces by septic contents of the kidney. Imperfect hæmostasis adds to the risks of sepsis and increases the chance of a fatal issue. Mayo employs a posterior incision.

Pelviolithotomy is the most generally useful operation for stone in the kidney. This was done in 206 cases. The kidney is separated from its fatty capsule and brought well up into the wound so as to expose the pelvis from behind. If the stone is felt it is removed by direct incision, and a search is made with the finger in the pelvis for

others. The wound in the pelvis is sutured with catgut and the fatty covering is stitched over the surface; two or three rolls of rubber tissue are introduced to drain the kidney space.

If the stone cannot be felt the pelvis is incised and the finger introduced. Needling and compression of the kidney should be avoided. Drainage of the pelvis is rarely required after removal of uncomplicated stones.

It is usually possible to remove stones situated in the calices through the renal pelvis, but if the communication is small a counter-puncture, permitting easy removal, should be made over the stone through the cortex. This is facilitated by the finger in the pelvis. Stones may thus be removed from several calices. Each cavity should be drained separately, and one tube at least should lead to the pelvis. This combined operation of pelviolithotomy and nephrolithotomy was done in thirty-four cases.

Nephrolithotomy should seldom be performed for stones in the pelvis or calices. It injures the kidney, and is liable to be followed by secondary hæmorrhage by the ureter four to ten days after the operation. Secondary nephrectomy may be necessary to arrest the bleeding. If the kidney is infected a tube should be inserted into the pelvis, otherwise drainage is unnecessary. If, however, several stones are present, and there is atrophy necrosis of several areas of the kidney substance, each cavity should be drained separately by small cigarette drains.

Nephrectomy.—This was performed in 204 cases, and with no reason to regret the operation in any of the cases, either from the conditions found in the kidney, or from the after-history of the case. The subsequent history of some cases treated by conservative means indicated, on the other hand, that removal of the kidney would have been better. In most of the cases a condition of pyonephrosis was present.

The operation may be rendered difficult on account of the fixation of the kidney by extensive adhesions. In such conditions a sub-capsular nephrectomy should be performed. The securing of the pedicle may be very difficult, and the method adopted by Federoff of Petrograd is probably the best. This consists in separating and drawing the kidney out of its capsule, and then, by a second incision, dividing the capsule over the pedicle, which can be secured by separate ligation of the vessels.

If forceps have to be left on to control the vessels in the pedicle they should not be unclamped till forty-eight to seventy-two hours later, but they should not be finally removed till eight to twelve hours subsequent to the loosening of their grip, in order to allow the compressed tissues to retract and to avoid hæmorrhage.

THE TREATMENT OF TETANUS.

The prophylactic value of tetanus antitoxin has been clearly proved by the experience of military surgeons in the present war. After the first two months of the war it was decided by the authorities of the Royal Army Medical Corps that a preventive dose should be given to every wounded man instead of leaving the decision to the discretion of the medical officer. The results of this order were excellent, and during a period of six months only thirty-six cases of the disease occurred in those who received a preventive dose of serum within twenty-four hours of being wounded. Bacteriological examination of many of the wounds showed that the tetanus bacilli were present, although no tetanic symptoms had arisen. During the same period thirty-four cases of severe tetanus occurred among the very small fraction of wounded men who, for one reason or another, had not received a prophylactic dose of the serum within twenty-four hours. The general use of preventive inoculation has also had an effect on the severity of the symptoms in those who have subsequently developed the disease.

The intramuscular or subcutaneous injection of repeated small doses of carbolic acid and the intrathecal injection of magnesium sulphate have not proved reliable methods of treatment in cases of tetanus in military surgery. Treatment by antitoxin is the only method on which there has been anything like general agreement.

Gibson (*Amer. Journ. Med. Sci.*, December 1916) quotes the above statements from a pamphlet published by the Royal Army Medical Corps in July 1915, and at the same time gives his views as to the best method of employing antitoxin in the treatment of tetanus.

Antitoxin treatment should be begun immediately on suspicion of tetanus developing and before the classical symptoms appear. A dose of 1500 units should be injected first into the wound or into its neighbourhood. At the same time 5000 to 20,000 units should be administered intraspinally, without an anæsthetic, unless the treatment of the wound requires it. In the course of the first twenty-four hours, in addition to the above, 10,000 to 20,000 units should be given intravenously in divided doses, say two or three. Antitoxin intravenously should be given next day, from 5000 to 15,000 units, whether the symptoms remit or increase. On the third day, if the symptoms continue severe or are worse, the intraspinal treatment should be continued. Intraspinial injection causes a temporary increase of symptoms and steep elevation of temperature, but these facts need not cause alarm. If, after this treatment, the patient holds his own or improves, intraspinal injection need not be repeated, but the daily injection of antitoxin intravenously should be continued until obvious remission or cure results. In one case a total of 169,000 units was

given with successful result, 29,000 units being injected intraspinally in six daily sessions.

The author hesitates to make definite statements from an experience limited to eight cases, but he is strongly impressed with the value of intrathecal injections of antitoxin, even in cases of the severest type.

PYLORIC STENOSIS IN INFANTS.

Gallie and Robertson (*Canad. Med. Assoc. Journ.*, January 1917) discuss the treatment of congenital pyloric stenosis, a condition which, if untreated, is associated with a mortality of practically 100 per cent. Under medical treatment, which consists in proper feeding and frequent gastric lavage, a certain percentage slowly recover. The proportion of recoveries with medical measures alone is between 40 and 60 per cent. of the cases, as recorded by various observers.

It is always advisable therefore to attempt medical measures first, but it is pointed out that this method of treatment is very tedious and sufficiently doubtful to demand the sharpest attention of the physician to see that the patient does not slip past the mark beyond which no form of treatment can save him. These patients have a habit of remaining in a stationary condition for days or weeks, and then suddenly of succumbing to inanition. The authors believe that, if there is no prompt response to medical treatment, some radical measure must be adopted if a high mortality rate is to be avoided. It is imperative that operation, if it is decided on, should be performed before the starvation of the patient makes interference dangerous.

The operation which the authors have employed is known as the Webber-Rammstedt method. The abdomen is opened by a small incision through the right rectus above the umbilicus. The thickened pylorus is then brought outside the abdominal incision and the condition inspected. Surrounding the pyloric orifice there is situated a smooth round swelling, white in colour, varying in size from a small to a large hazel-nut. The mass may be as hard as cartilage or of the consistency of uterine muscle. The stenosis is due entirely to the contracted and hypertrophied muscle, and there is no diminution in the size of the tube of mucous membrane, as can be demonstrated post mortem by removing the muscular coats.

By squeezing on the air in the stomach the degree of stenosis can be demonstrated.

An incision in the long axis of the pylorus is now made along the entire length of the swelling at its upper border, where there is a space about an eighth of an inch wide which is practically bloodless. The incision is carefully deepened till the mucous membrane begins to bulge into it. The external surface of the mucosa is exposed throughout its whole length. The muscle is so hard that, after the incision is

completed, there is very little retraction, and the cut edges therefore should be gently stretched with forceps, so that the mucosa is exposed for a width of an eighth of an inch or more. It will then be seen to be of large lumen and to bulge into the wound. There is rarely any bleeding, but small points of oozing should be arrested. The relaxation of the stenosis can be finally demonstrated by passing a duodenal catheter or by simply compressing the air in the stomach through the pylorus.

The method is simple and the operation can be completed in fifteen or twenty minutes. The authors had eleven recoveries out of sixteen cases. Most of the fatal cases were too late in being operated upon.

One case, however, died from hemorrhage, and in a second case it was found that the incision had not been sufficiently thorough and the stenosis had not been completely relieved.

J. M. G.

OBSTETRICS AND GYNECOLOGY.

UNDER THE CHARGE OF

A. H. F. BARBOUR, M.D., AND J. W. BALLANTYNE, M.D.

CURETTAGE AND ITS SURPRISES.

PROFESSOR M. MURET of Lausanne (*Ann. de gynéc. et d'obstét.*, November-December 1916, 2nd ser., vol. xii. pp. 321-342) records some interesting, one may almost say entertaining, surprises following upon the exploratory curettage of the uterus. Every gynecologist has probably had experience of such unexpected happenings as the report from the laboratory of the presence of cancer or tuberculosis in scrapings from a uterus believed to be the seat of nothing worse than endometritis, or the discovery of a healthy uterus at a hysterectomy performed on account of a firm report of malignancy derived from the examination of a previous scraping. They are rare, says Professor Muret; they are certainly rarely published, for reasons that are easily recognised. They are not, however, to be explained by administrative errors (exchange of specimens in the laboratory) in every case.

Various kinds of surprises are discussed and grouped under four headings. In the first group are the cases in which curettage has given a positive indication of malignancy, and yet the extirpated uterus is discovered to be without a trace of a malignant growth. Four such instances are narrated in full by Muret. In three of them no certain explanation was forthcoming, but the suggestion is hazarded that the carcinomatous invasion of the mucous membrane was very superficial or clearly limited, was entirely scraped away, and did not return. In similar cases described by others another explanation was found in the

fact that a carcinomatous polypus with a healthy pedicle had been removed by the curettage. Muret's fourth case supplied yet another explanation of the unexpected result. The patient, a woman of 63 years, suffering from post-climacteric bleeding, was curetted, and the diagnosis of adeno-papillomatous carcinoma of the body of the uterus was confidently made; vaginal hysterectomy was performed, and the uterus was found to be absolutely free from malignant disease; two years later, however, the woman developed a tumour of the left ovary which was removed by ovariectomy, and found to be histologically of exactly the same nature as the uterine scraping, viz. a papilliferous adeno-carcinoma. The ovarian growth, in this case, was evidently a metastatic growth, and the diagnosis founded on the curetting had been correct. It was noteworthy that the two microscopic examinations were made by two different pathologists, with an interval of two years.

Professor Muret gives one illustrative example of a second group of cases, that in which the exploratory curettage shows positive indications of malignancy, the examination of the extirpated uterus is negative at first, but after long and patient research yields traces of carcinoma. In the instance referred to it was only on the examination of the sixth piece of uterine tissue that carcinomatous cells were detected. Of course, if this observation be pushed to its logical conclusion it means that, to gain a sure diagnosis, the whole uterus must be cut and studied in serial sections, a procedure which in practice can rarely be practicable. A third group of cases contains the patients in whom a positive curettage of malignancy is not followed by a radical operation, and yet the woman remains well, and is therefore apparently cured. An interesting case is cited in which Professor Muret, receiving a positive and confident report of malignancy from the examination of uterine scrapings, strongly advocated a radical operation; the patient as strongly resisted the suggestion. She then consulted another gynecologist, who advised against operation, being moved thereto by simple kindheartedness and her tears (*"par pure bonté d'âme et à cause des larmes de la malade"*); the woman then resorted to charlatans and herbalists, and some months later she was free from symptoms. It is obvious that various explanations may be advanced to account for such results; but that which is favoured is the possibility of a thorough curettage having removed all the malignant disease, which, of course, must then have been quite local and superficial.

In a fourth group of surprises a negative uterine curettage is followed by a continuance of symptoms and an extirpation of the organ, with the discovery of a carcinoma therein. Such happenings are naturally very rare, for few gynecologists will do a hysterectomy after a negative curettage; but Muret has found a few of them in literature, and he adds the record of a case in which the carcinoma was so situated

in the uterine cavity that it escaped the sweep of the curette. Among the conclusions drawn from the experiences narrated is the necessity which a continuation of symptoms (even in face of a negative report from the examination of scrapings) imposes on the gynecologist to recommend a radical operation. Notwithstanding this conclusion, Muret thinks that every curettage should be followed by a microscopic examination of the scrapings by a competent specialist. One can easily agree with him, but what seems to be another, and perhaps a more logical, conclusion is that such microscopic examinations cannot be absolutely trusted for a certain diagnosis and a safe prognosis. Nevertheless, although we may trust it less, we shall not by any means give up the use of the exploratory curettage. The warning which must be taken to heart is that there is no one certain means of deciding the question of malignancy, no royal road, so to say, to a sure diagnosis. One must look at all the facts.

PREMATERNITY WORK AND ITS RESULTS.

It seems so reasonable to expect that medical supervision of the mothers in their pregnancies will prove beneficial to their infants that the presentation of statistics has hardly been asked for. This, however, is scarcely the scientific method of proceeding, and Dr. Michael M. Davis of Boston (*Boston Med. and Surg. Journ.*, 4th January 1917, vol. clxxvi. pp. 5-10) has supplied figures. He has drawn them from the results of the Boston prenatal work, as it has been called. Its purposes were—(1) by making proper medical examination, pelvic measurements, etc., of pregnant women before confinement (when possible some months before), to decide whether normal delivery is possible or likely, and to give such medical advice as may be indicated for the comfort and safety of all women, and, in particular, when hospital care and operation are necessary; (2) by visits from a trained visiting nurse, and reports to the physician, during the course of pregnancy, to instruct the mother and father in the hygiene of pregnancy, and to make the best possible preparation of the home for the sake of the coming child; (3) by expert medical care at confinement to minimise the risk of delivery to mother and child; (4) by frequent visits from the nurse during the two weeks or so following confinement, to provide needed bedside care to the mother, and give the baby the best start possible. This work has been rapidly developed, and 2000 cases, or about one-tenth of all the births in Boston, are now cared for annually by the nurses of the Instructive District Nursing Association; the medical service for the examination of pregnant women has been provided by physicians in private practice or connected with the various hospitals or associations. For the sake of comparison Dr. Davis has taken the work done in 1914 and 1915 in five wards—two in East Boston, which has an estimated population of 58,500; and three in South Boston, with a population of

66,300. The babies which had received prenatal care numbered 103, or 5 per cent., of all the births in East Boston in 1914, and 113, or 6·23 per cent., in 1915; in South Boston the numbers were 250, or 14·2 per cent., in 1914, and 264, or 15·3 per cent., in 1915. The length of the prenatal care increased in 1915. Thus, only 50 per cent. had received prenatal care for five weeks and over in 1914, whilst 60 per cent. had received it for this period in 1915. To put it in another way: in 1914 one-fifth of the mothers had the prenatal care for only a week before the confinement, whilst in 1915 the proportion had sunk to one-eighth. Educational and advisory visits by the nurse were made at weekly to fortnightly intervals. Almost all the cases were confined at home, less than 4 per cent. going into hospital. Postnatal care by the visiting nurse, under the physician's supervision, was carried on for a period of from ten days to two weeks. In many ways it is possible to test the results; but in order to avoid fallacies the simple method of looking to the deaths of the infants was selected, viz. the still-births and the infantile mortality. These deaths were compared with those occurring among the children of the women who did not receive prenatal care. It may be mentioned here that in Edinburgh the work above described is called the out-patient part of the prematernity system, including the antenatal clinic held at the hospital. With regard, in the first place, to the still-births, it was found that they constituted both in 1914 and in 1915 2 per cent. of the living births, whilst in Boston, taken as a whole, they constituted 4 per cent. In other words, the proportion of still-births amongst the women who received prenatal care was only half that amongst the general population. With regard to infantile mortality it was discovered that in 1914 (the results for 1915 could not be given till the end of 1916) 13 babies died under one year of age in 346 living births, *i.e.* a death-rate of 37·5 per 1000 among the cases receiving prenatal care, whilst in the same wards the death-rate among the babies not receiving it was 109·3, or almost three times as high. With regard to deaths under one week and one month, the results for both 1914 and 1915 can be given: for both those under a week and under a month the deaths in 1914 among the babies not prenataally cared for was three times as high among those who received care, and in 1915 it was twice as high. These are striking results, and all fallacies must of course be eliminated. The low infantile mortality might conceivably be due to postnatal care given by milk stations and other agencies during the first year of the lives of these children; but this cannot possibly account for the differences under the ages of one month, and still less of one week; in them at least prenatal care must be regarded as having an effect. Another possible fallacy may lurk in the type of mother who accepts prenatal supervision. Were these women in better economic circumstances, and were they of higher intelligence? The answer Dr. Davis is able to give to the first question

is that the prenatal cases were drawn mostly from families of low income. With regard to the second, he admits that women of unusually low intelligence would probably not seek or be interested in accepting the prenatal work ; but, on the other hand, he had no reason to believe that the mothers who received the prenatal care represented any higher order of intelligence than the average of their locality. Dr. Davis further gives detailed tables regarding the causes of death in the fatal cases, etc., which may be usefully studied ; but the outstanding and impressive result is the demonstration that prenatal care does diminish both the still-birth rate and infantile mortality, and that it does not fail to have a good restrictive effect upon what may be called the neonatal death-rate, which is the most serious part of the infantile rate. One was prepared to know that prematernity work benefited the pregnant women themselves ; but this striking exhibition of its good effect upon antenatal and neonatal welfare could hardly have been confidently expected.

J. W. B.

INFECTIOUS DISEASES.

UNDER THE CHARGE OF

CLAUDE B. KER, M.D.

TREATMENT OF ENTERIC FEVER WITH COLLOIDAL GOLD.

SALOMON (*La Presse Médicale*, 5th October 1916) has an interesting account of the treatment of enteric fever by this method. The use of colloidal metals in infective conditions appears to have been relatively common in France since 1902, when Netter drew attention to its possibilities. It, nevertheless, has not, in the opinion of Salomon, won the popularity which it deserves, and he considers that this is due to the unpleasant results which frequently follow the intravenous method of injection, which is that generally practised. Enteric patients, moreover, appear to be less tolerant of the drug, when administered in this manner, than are persons suffering from other diseases. In 1914 Letulle and Mage reported excellent results in enteric fever, and the difficulty of employing balneation systematically in the military hospitals no doubt helped to introduce a method of treatment which can be easily carried out.

The bad results which are liable to follow the introduction of colloidal gold into a vein, while perhaps especially severe in enteric fever cases, occur equally in other diseases subjected to the same method of treatment. The injection is followed by violent rigors and symptoms resembling a malarial attack. Vomiting and involuntary evacuations sometimes occur. Cyanosis, dyspnoea, and a rapid thready pulse often cause great anxiety, and must be promptly treated with

hot drinks and cardiac stimulants. After this cold shivering stage the temperature rises to high levels, which, of themselves, must be regarded as dangerous. Profuse sweating with a fall of temperature follows, and in favourable cases the pyrexia subsides altogether, though this appears to occur seldom after the first injection.

Salomon is convinced of the efficacy of this treatment which he employed in 77 cases, and would have continued to employ, had he not been impressed by the risk of fatal collapse. The dose given did not affect the result. Some patients tolerated 2 c.c. fairly well, others were seriously upset by doses of 1 c.c. or even $\frac{1}{2}$ c.c., and it seems probable individual idiosyncrasy plays some part. The moral is therefore, to try and get equally good therapeutic results by another method of administration than the intravenous one. As Salomon had observed that the first dose usually caused the greatest disturbance, he endeavoured to accustom the patient to the drug by preliminary subcutaneous injections, doses of 10 to 12 c.c. being given by this route. Slight reactions of temperature sometimes followed the injections and the general results, though fairly favourable in 44 cases, appeared doubtful. The subcutaneous injections, moreover, were extremely painful. Finally, then, Salomon tried intramuscular injections, and found them free from the disadvantages of the intravenous and more effective than the subcutaneous ones. They cause no pain. There is sometimes a short attack of shivering, and usually a reactionary rise of temperature. By next day the temperature of the patient has been appreciably reduced and the general condition improved. Occasionally there is very free discharge of urine, and the temperature falls to normal and remains there. More frequently further injections are required, being indicated when the temperature begins once more to rise, usually at intervals of two days. The dose employed for intramuscular injection is from 2 to 4 c.c., and, in Salomon's view, the action, if a little slower, is as reliable as when the drug is administered intravenously.

Jouve-Balmelle (*Le Progrès Médical*, 5th September 1916) has also made use of this method of treatment with success, having, like Salomon, hesitated to employ the intravenous route on account of the accidents produced. As a general rule, 2 c.c. of electraurool were injected into the muscles daily, and, if we are to judge by the temperature charts which illustrate the two articles, with more definite and obvious results than those that followed the more sparing and cautious administration of the remedy by Salomon, whose charts are somewhat unconvincing. Jouve-Balmelle claims that the treatment is followed by progressive lowering of temperature, which persists if the injections are continued and ceases if they are suspended.

I am unaware whether colloidal gold has been used in the treatment of enteric fever in this country. The intramuscular method should certainly make its employment more simple, and a study of Jouve-

Balmelle's temperature charts suggests that the drug does exercise some influence on the course of the fever. The somewhat abrupt termination of some of the cases reported by Salomon, on the other hand, might be explained by the fact that the patients had been vaccinated against the fever and were therefore perhaps likely to have an abortive attack in any case. In others, again, the infection was a paratyphoid one, and to some extent, therefore, less severe. On the whole the treatment appears to do no harm, and a trial of it might be well worth while. Both writers used other therapeutic measures concurrently with the injections, Salomon's cases in particular being treated with the continuous application of ice to the abdomen.

THE INFLUENCE OF URÆMIA IN ENTERIC FEVER.

Jouve-Balmelle (*loc. cit.*) raises many points of interest in the paper just quoted, but devotes his main attention to the question of albuminuria in enteric fever, and its results. In 600 cases he found albumin absent only in fifteen, an experience which must surely be very unusual. He admits that the albumin in two-thirds of the cases was only present in very small quantity, though sufficient in his opinion to justify the absolute restriction of the patient to a milk diet. But in one-third of the cases the implication of the kidney was much more definite, and marked diminution in the amount of urine, large quantities of albumin, and occasionally suppression of urine were observed relatively frequently.

Of the patients treated by Jouve-Balmelle 180 were of the "ataxo-dynamic" type, that is to say, they were in what we should describe as the "typhoid state." Nervous complications were common, and twenty cases suffered from meningism, some even showing stiffness of the neck and Kernig's sign. Only two, however, had a real meningitis, the spinal fluid in the remainder being quite normal. As some of the worst cases also suffered from renal trouble, it appeared to Jouve-Balmelle that uræmia possibly was the real cause of the "typhoid state." He considers that the usual symptoms of uræmia are very similar to those of severe typhoid fever with nervous symptoms. He was led by this observation to examine the blood quantitatively for urea, and his investigation resulted in the finding that, while the ordinary cases of enteric fever examined showed no augmentation of the amount of urea in the blood, the ataxo-dynamic cases gave a more or less marked increase of the normal figure, or, in other words, had definitely uræmia. Moreover, the amount of urea in the blood was, as it were, parallel to the condition of the patient, increasing and diminishing synchronously with the exacerbation or cessation of the nervous symptoms. Jouve-Balmelle, therefore, concludes that "the ataxo-dynamic condition does not constitute a form of enteric fever due to the action of the bacillus

or its toxins on the nerve centres. The nervous symptoms of the fever are associated with a complication—uræmia—the symptomatology of which they reproduce, and which itself depends on the primary complication—typhoid nephritis.” The importance of this theory is obviously its bearing upon therapeutics. The application of treatment suitable for uræmia, a rigid milk diet, and local and general bleedings gave Jouve-Balmelle excellent results. Whereas 23 per cent. of 106 cases with nervous manifestations terminated fatally in the period previous to this uræmic treatment being applied, after its inauguration only 12 per cent. of seventy-four ataxo-dynamic patients died. These results are certainly very striking; but meningism undoubtedly occurs in patients who show no albuminuria, and albumin is by no means an invariable symptom in the typhoid state. In our Edinburgh cases albuminuria is in fact very unusual. Nevertheless the estimation of the amount of urea in the blood of cases of the type under discussion might be practised with advantage, even if we are reluctant to admit that urea is responsible for symptoms which we have long confidently attributed to the action of the toxins of the typhoid bacillus. The patients treated by the French observer were military ones. Is it possible that some at least of them were also the victims of the nephritis which appears to have been so common in the trenches?

NOTIFICATION OF THE MINOR INFECTIOUS DISEASES.

Williams (*Albany Medical Annals*, August 1916) gives reasons why it is desirable that such apparently trivial ailments as chicken-pox, mumps, and rubella should be made notifiable. An inquiry was made as to the opinion of eighteen leading public health experts and clinicians, and, as a result, it was decided to require the notification of the diseases in question for the following reasons:—In the first place, without notification any attempt to control or abolish these infections would be futile. Chicken-pox is not infrequently confused with smallpox and is a very contagious disease, and is, in addition, liable to be dangerous in itself. Rubella should merely be notifiable, and its diagnosis should be confirmed by experts in order to prevent confusion with scarlet fever. Mumps may be a more serious disease than is usually supposed, and for this reason should be reported.

The rules laid down for isolation and disinfection are not without interest. Chicken-pox cases are isolated for at least twelve days or until the crusts have fallen and the scars completely healed. The medical officer may order disinfection in cases in which he thinks it desirable; otherwise it is apparently not insisted on. Mumps requires isolation for a period of not less than two weeks or one week after the disappearance of swelling. Neither isolation nor terminal disinfection is required in the case of rubella.

While it must, of course, be admitted that notification of all infectious diseases is theoretically desirable, it is doubtful if these rules will be imitated in this country, and it is certain that the advantages would not justify the expense. The greater prevalence of smallpox in the United States gives a valid reason for the notification of chicken-pox in that country, but our own custom of notifying it during smallpox epidemics is probably sufficient for the purpose, though accidents, due to the more severe disease being regarded as chicken-pox, do undoubtedly happen. The risks of mumps seem to be somewhat exaggerated, and as their incidence is in the early stage of the disease, it is difficult to see how notification would obviate them. We may well doubt if expert supervision of cases notified as rubella would commend itself to the general practitioners of this country. Our Edinburgh experience is that it is much more common for rubella to be labelled scarlet fever than it is for the reverse to take place. A good point, however, in the American rules is the abolition of isolation for this very trivial condition.

THERAPEUTICS.

UNDER THE CHARGE OF

JOHN EASON, M.D.

THE ACTION OF DIGITALIS IN PNEUMONIA.

FROM time to time the discussion is renewed as to whether the use of digitalis in pneumonia is advantageous. A decision has been difficult, because the difference between action as such and beneficial action has not been sharply drawn. One or two eminent authorities have stated that, when given by the mouth, digitalis is of no practical value, if it has any action at all in pneumonia. A. E. Cohn and Ross A. Jamieson have recently made some valuable observations on the subject as the result of their investigations in the Hospital of the Rockefeller Institute for Medical Research (*Journ. Exper. Med.*, No. 1, vol. xxv. p. 65). They show that action on the heart by digitalis takes place in pneumonia, and also that its action under certain circumstances is beneficial. The number of cases of pneumonia on which the observations were based was 105.

Digitalis was given to 49 patients; another 56 cases of pneumonia received no digitalis and served as controls. The drug was usually given by the mouth in the form of tablets of digipuratum, each tablet containing the equivalent of 0.1 gm. of the powdered leaves. The daily dose was usually 0.4 gm. Electrocardiograms were made of all the patients. In the patients to whom digitalis was administered the curves were made frequently—usually once, or oftener, each day. As criteria for judging the action of digitalis the effect upon the length

of the auriculo-ventricular interval and the effect on the T wave of the electrocardiogram were utilised. In certain cases the effect of digitalis on the rate of the ventricles when the auricles were fibrillating was an important additional criterion. In general, these criteria permitted the authors to judge whether digitalis was acting. Of the 49 patients to whom digitalis was given 39 were grouped as available, because they received amounts of digitalis sufficient to influence the curve, according to the experience of the authors in studying the action of digitalis in non-febrile individuals. The amount regarded as sufficient to produce the changes looked for was fixed at 0.8 gm.

The investigation was undertaken specially to elucidate the action of digitalis during the continuance of fever.

The cases were further subdivided into—(1) those which showed changes both in P-R time (auriculo-ventricular interval) and in the T wave; (2) those which showed changes in the T wave alone; (3) those which showed changes in the P-R time alone; and (4) those which showed changes neither in the P-R time nor in the T wave.

Of 50 control patients, cases of pneumonia which received no digitalis during the febrile period of the disease, 88 per cent. (44 cases) showed no change in either P-R time or in the T wave; 8 per cent. (4 cases) showed changes in the T wave alone; 4 per cent. (2 cases) showed changes in both the P-R time and in the T wave. Of the 36 patients to whom digitalis was given, on the other hand, 77.7 per cent. (28 cases) showed changes both in the P-R time and in the T waves; 16.6 per cent. (6 cases) showed changes in the T wave alone; 2.7 per cent. (1 case) showed changes in the P-R time alone; and 2.7 per cent. (1 case) showed changes in neither the P-R time nor in the T wave. The results show briefly, therefore, that during the febrile period 88 per cent. of the control cases showed no change in the electrocardiogram, while 97.2 per cent. of the cases to whom digitalis was given did show changes.

The authors were also able to study the action of digitalis on the rate of the ventricles when the auricles were fibrillating. In five separate instances, when this rhythm set in, digitalis reduced the resulting high ventricular rate while fever was present. From these facts it is apparent that digitalis does act during the febrile stage of pneumonia, and the electrocardiographic changes produced are only infrequently met with when no digitalis is given.

In the single patient to whom a sufficient amount of digitalis was given, and in whose curves during the febrile period the expected alterations did not take place, death occurred.

With regard to auriculo-ventricular conduction (P-R) time a striking lengthening of the time did not occur as a result of the pneumonic infection in the 50 control cases. Indeed, in 11 of these the time was decreased. In none was there any lengthening in conduction leading

to heart block. On the other hand, in the cases to which digitalis was given there was, with only three exceptions, an increase of 0.04 second or more. In seven instances of those treated with digitalis the rise led to block.

Digitalis was found to alter the T wave oftener and sooner than it does the P-R time. This is in agreement with what the authors found in giving digitalis in an earlier research on heart cases. As a guide, therefore, to giving digitalis to patients suffering from pneumonia, they ascribe a distinct value to the use of the T wave as a sign.

From a consideration of all the evidence they were able to gather, Cohn and Jamieson believe that the intoxication due to pneumonia exerts no influence against the action of digitalis. Digitalis produces the same effects in pneumonia, judged by their criteria, that it does in the absence of fever. They consequently feel justified in assuming that whatever actions the drug possesses are exerted also during pneumonia. If the circumstances of the case are correctly deemed to require this action, advantage may be expected from its use. The dose and the time required to produce these effects are the same as in non-febrile cases. By extracts from the most important literature on the subject the authors bring evidence to show that the heart muscle does not undergo changes such as occur in other infectious diseases. Changes in conduction time from the effects of the disease on the heart muscle are therefore not to be expected. The changes in conduction, reported by others as attributable to the disease, seem to be almost entirely associated with the giving of digitalis.

In view of the carefully conducted observations above briefly outlined digitalis must be credited with the power to act, in some respects, as well in pneumonia as in afebrile conditions. The quality of action would appear to be the same in each of the circumstances, and it is a considerable gain for the medical attendant on a case of pneumonia to know that digitalis does or should so act. Clinically, the absence of a response may sometimes be due to the inertness of the preparation used. Again, Mackenzie has said, "I have never seen much good follow the administration of digitalis in acute febrile conditions;" and the late Dr. G. A. Gibson stated that in the worst cases of pneumococcal poisoning the heart refuses to respond to digitalis. Krehl, on the other hand, believes it to be beneficial. With such conflicting opinions, based on the clinical experience of important authorities, one is forced to the conclusion that whatever the action of digitalis may be qualitatively in pneumonia, quantitatively it is sometimes negligible. In a minority of cases the preparation may be an inert one; usually it would appear from the work of Gunn that the cause of failure of digitalis bodies is that the heart is in a refractory state from the presence of toxins. He has at least shown that high fever is not in itself the cause of failure.

LARYNGOLOGY, OTOTOLOGY AND RHINOLOGY.

UNDER THE CHARGE OF

A. LOGAN TURNER, F.R.C.S., AND J. S. FRASER, F.R.C.S.

ON THE USE OF RADIUM IN LARYNGOLOGY.

A DISCUSSION upon the use of radium in the field of laryngology followed the reading of a paper by Bryson Delavan at the meeting of the American Laryngological Association, May 1916. The writer makes some pertinent remarks regarding the publication of the results of treatment which it would be well for therapeutists to bear in mind. The study of radium as a therapeutic agent is still in its infancy, and few investigators are yet ready to issue formal reports regarding the real success of their work. Any attempt to drag it before the public at the present time would be premature. What is needed is not publicity, but rather the development of scientifically proved data upon which, and only which, reliable reports of progress are possible. The securing of such data requires the long-continued and painstaking study of the action of radium, under conditions favourable for accurate observation, in the hands of men scientifically qualified for the work. When these conditions have been fulfilled, and not till then, we may hope for the beginning of a literature at once valuable and instructive.

Information is yet required as to the best method of making the application in the respiratory passages, as to the duration of such applications, and as to its dosage and control. There is evidence, however, according to Delavan, that the progress being made in the knowledge of radium efficiency in non-malignant surgical conditions, and in certain non-operable conditions of the upper air-passages, continues to be gratifying. Much attention is being given to the study of radium as applied to new growths in general, and many highly interesting and important facts are being obtained. This is especially true of growths of a non-malignant character. In the treatment of naso-pharyngeal fibroma the use of radium has proved encouraging. In the treatment of non-malignant intra-laryngeal growths many tumours of various histological structures have disappeared in a number of cases with complete restoration of the singing voice. The treatment of papilloma of the larynx is particularly promising, in view of the success already attained with this form of growth, as with warty growths in general in other parts of the body.

Freudenthal reports a case of fibro-sarcoma of the right maxillary sinus which was cured, and a case of sarcoma of the tonsil in which the growth disappeared and remained in abeyance for six years, when it recurred and the patient died.

The question of cure should be dealt with very carefully; recurrences of the growth take place when the patients may have passed into other hands, and it would be wiser if results were not published, as they not infrequently are, when what is actually visible to the naked eye has disappeared. In cavities like the nose and naso-pharynx tumour tissue may still be present, though not visible by ordinary methods of examination.

The final value of radium in some of the more serious affections has yet to be proved—especially is this true of its use in carcinoma; for while a number of cases have been placed under treatment, it has been claimed by some that the effects of the radium has, in certain instances, been unsatisfactory; and even in those in which its influence has been apparently beneficial, the improvement has not always been lasting, or else too little time has yet elapsed to prove the final result. In some cases, indeed, the advance of the disease has been actually hastened. The difficulty of administering sufficient doses in the case of the upper air-passages must be taken into account. Improved technic and further experience may lead to more hopeful results.

Delavan reports upon two cases of epithelial cancer involving the left side of the pharynx close to the larynx. Both patients were men in the early fifties, hitherto in perfect health, active, vigorous, and of excellent antecedents. When first seen, the disease had also invaded the interior of the larynx, the tonsil, and base of the tongue. Both were subjected to radium in the same institution, and in both the results were materially the same. The first effect of the radium locally was an almost complete cessation of the abnormal secretions; fetor, too, disappeared. The areas of ulceration rapidly diminished in extent, and in the less severe of the two cases disappeared. The swellings, which had appeared over extensive areas, decreased markedly; the infiltrated tissues were reduced in size and became soft to the touch and more normal in appearance. Great improvement took place in the functions of the throat; the voice became clearer, and deglutition, which had before been almost impossible, showed such improvement that both patients were able to swallow without pain, and could largely increase the variety of their food. General improvement also took place. Even admitting an unfavourable

end of the disease, the benefit gained in the relief of suffering and in the added comfort would well repay them for any inconvenience that the radium had caused. The study of the radium treatment of carcinoma has just begun. Some at the very outset are already discouraged, and are stating that they are unwilling to believe in its efficacy. The failure to gain uniformly reliable results is probably due to imperfect knowledge of the methods by which the radiations can be controlled, of the amount of radium which should be used, and of the correct duration of the exposures. The important principle has been proved that under proper application radium will destroy a superficially placed cancer cell. Granting this, it is by no means impossible that, with increased knowledge, deeply seated cells may be successfully reached and destroyed, while the surrounding tissues are effectively protected.

In the discussion which followed, one speaker drew attention to the severe burns which may follow its application. It is difficult to properly screen the material when placed in the mouth, nose, or naso-pharynx: if too little is used the action is not sufficient; if too much, the burns may be very severe. He emphasised the late appearance of the burns in some cases, and recorded another instance where the radium destroyed the growth in the nose, and at the same time it destroyed the external nose. Reference was also made to the possibility of stimulating the action of the growth by the use of too weak applications. Jackson described the technic adopted in the treatment of laryngeal carcinoma. Tracheotomy is performed, and the capsule containing the radium being anchored to the cannula is pushed upward into the larynx. The capsule is composed of gold, on to which a coating of hard rubber is vulcanised. The process of vulcanising the rubber prevents any possibility of detachment. The tracheotomy tube is then inserted, the threads from the radium capsule being tied to the shield of the cannula. A. L. T.

NEW BOOKS.

Medical Diseases of the War. By ARTHUR F. HURST. Pp. 151.
London: Edward Arnold. 1917. Price 6s. net.

THIS book is, as the author states in his preface, a record of his own observations of the various diseases contracted during active service in the war, and also the consideration of practically all recent literature that bears on the subject. It is clearly and concisely written, and nowhere shows any trace of hurry or unevenness.

It is divided into ten chapters, of which the longest is that on functional nervous diseases. In these conditions treatment by suggestion and hypnotism has evidently proved very successful in the author's hands.

In the chapter on dysentery the important part played by flies in the spread of the various forms of this disease is fully emphasised. Nothing, however, is said about the effect of emetine treatment on the heart.

Trench fever is described as a lice-borne protozoal infection of the red blood corpuscles. It is stated that there has been no fatal case. There is no treatment which prevents the return of fever in the prolonged form of the disease. Acetyl-salicylic acid is the most useful analgesic in the condition.

Beriberi, paratyphoid fever, epidemic jaundice, soldier's heart, war nephritis, and gas poisoning are all dealt with in a thoroughly satisfactory manner.

Dr. Hurst is to be congratulated on the production of one of the best and most useful books that the war has given rise to.

Care and Feeding of Infants and Children: A Text-Book for Trained Nurses. By WALTER REEVE RAMSEY. Pp. x. + 290. With 123 Illustrations. Philadelphia and London: J. B. Lippincott Co. 1916. Price 9s. net.

THIS book contains much more information than its title suggests. Within its pages there is a veritable *résumé* of diseases in childhood. It is all most interesting and excellently illustrated, and should form an attractive "Text-Book for Trained Nurses," more particularly for those of the New World. But we cannot help feeling that there is a great deal more here than is wise or necessary to set before the most highly-trained nurse or lay child-welfare worker. For the nurse with lengthy practical experience, or the motherly woman with good education and sound common sense, the book should prove attractive and useful, if something of a luxury.

The contents of the book are, however, to a large extent unnecessary study, and for a young nurse we certainly consider a less comprehensive text-book advisable.

Extra-Ocular Pressure and Myopia. By ISLAY B. MUTTIEHEAD, M.D. Pp. vi. + 96. London: John Bale, Sons & Danielsson, Ltd. 1916.

THIS little book appears to have been written with the object of showing that myopia is not caused by excessive use of the eyes for near work, and that it should not be treated by the use of fully-correcting glasses. While most ophthalmologists will subscribe to at

least the first of the author's propositions, few will agree with, even if they can follow, the course of the argument and the grounds upon which it is based. Most of what is accepted as evidence is highly controversial matter, and of doubtful value even if proved. The author's conclusions are already accepted by many on different and sounder grounds, and it is difficult to see how they are strengthened by the present work.

A Text-Book of Pathology. By W. G. MACCALLUM, Professor of Pathology in the College of Physicians and Surgeons, Columbia University, New York. Pp. xv. + 1085. With 575 Illustrations. Philadelphia and London: W. B. Saunders Co. 1916. Price 35s.

THE clearest indication of the plan and scope of this work can be given by a quotation from the preface:—

“An effort has been made to discuss the general principles of pathology as illustrated by a study of the commoner and more important diseases. It is, therefore, in no sense intended as a book of reference. No attempt has been made to describe systematically all the diseased conditions which may occur in each organ, and for that reason there is no division into general and special pathology. Instead, the whole is constructed upon the idea that all pathological disturbances are the result of some form of injury, or of the immediate or more remote reactions of the body to injury. It has been found possible to carry out this conception quite logically except where, as in the case of tumours, we are quite ignorant of the causes of the disease.”

In reviewing a book of this nature we feel that criticism of details is less important than to determine how far the author has been successful in his attempt to place the teaching of pathology upon a logical and rational basis—that of causation: and we may say at once that he has been highly successful, at least so far as is possible at the present time.

The book begins with eight chapters on the blood and tissue fluids, and on the structure and metabolism of the cell, both normal and perverted. In this section there are important chapters on disturbances of fat, protein, carbohydrate, and pigment metabolism. The following five chapters deal with the defences of the body against injury, and to these succeed four chapters on illustrative examples of inflammatory and reparative processes. The greater part of the volume—twenty-eight chapters—is occupied with the discussion of the action of various types of “injury,” this term being employed in its widest sense to include all injurious agencies and influences which bring about a departure from the state of health. After a chapter on arthritis

deformans and related diseases, the rest of the book—ten chapters—is taken up with the discussion of tumour-growth.

Though the whole book reaches a very high standard, we would draw attention to the chapters dealing with metabolism, and especially to those upon diseases of the blood and blood-forming organs, and on diseases due to injuries of the organs of internal secretion. These last are the best in the book, and we question whether a better presentation of the subjects concerned is available in any other text-book of pathology.

A valuable feature of the book is the frequent reference to defects in our knowledge, or to the lack of adequate support for many generally accepted explanations and theories. This will help to indicate the general fairness and breadth of outlook with which Professor MacCallum's extensive experience and wide knowledge have been applied.

As we have already remarked, criticism is here of secondary importance, for even though we are not in accord with some of the author's views—as, for example, those on diseases of blood-vessels and of kidneys—we recognise that opinions and descriptions of these diseases vary in almost exact proportion to the number of pathologists who possess any considerable length of experience and have developed independent views.

It is evident that Professor MacCallum's spiritual home, like that of a well-known politician, is in Germany, and though we acknowledge that we have to thank German investigators for a vast amount of progress in pathology, it is to be hoped that the contributions of France, Italy, and Great Britain are not so insignificant as might be inferred from the predominance of references in this book to German literature.

The illustrations, some of them in colour, are very fine. The book is well got up, and the only printer's errors we have noticed occur in the references and in the index.

The volume, as a whole, is worthy of Professor MacCallum's reputation.

Handbook of Surgical Operations. By K. K. CHATTERJI, F.M.C.S.I.
Pp. 238. With 53 Illustrations. Calcutta: Butterworth & Co.
1916. Price 7s. 6d. net.

THE author of this small handbook is lecturer on operative surgery at the Campbell Medical School in India, and the text has been based on his course of lectures. A judicious selection of operations has been made and alternative methods of operating have been omitted, as such are liable to confuse the student. The descriptions are concise and clear, and are generally prefaced by a short account of the surgical

anatomy of the part and of the indications for operating. The illustrations are well designed and reproduced, and include several coloured plates. The text-book should prove useful to students studying operative surgery for the first time.

NEW EDITIONS.

Essentials of Chemical Physiology. By W. D. HALLIBURTON. Ninth Edition. Pp. xi. + 324. With 72 Illustrations. London: Longmans, Green & Co. 1916. Price 6s. net.

ON the appearance of the ninth edition of this book it may not be out of place to refer to some of the merits by which it has established its place in the educational literature of physiology.

Physiological chemistry, like histology, must be taught in part by practical method; like histology, too, it is inadequately dealt with in the ordinary text-books of physiology. Professor Halliburton's book is not only a practical guide, but fulfils the function of a text-book of the subject.

On the practical side it is admirable. The experiments are carefully chosen, there is no overloading with detail, and the material is representative. The author nowhere succumbs to the temptation, to which less experienced teachers are prone, of exalting the interest in pure chemistry as an object in itself; for weal or for woe the student who has reached physiology must be considered as having attained a certain standard of chemical apprehension. Each practical lesson is followed by a general account, in which the subject-matter of the experiments is presented in its wider bearing. The method is, of course, excellent, and the author's power of exposition is seen to advantage, especially in the general part. The book contains also an advanced course and a voluminous "Appendix," in which special apparatus is described and some accounts of physical and colloidal chemistry given.

Diseases of the Eye. By G. E. DE SCHWEINITZ. Eighth Edition. Pp. 697. With 386 Illustrations and Seven Coloured Plates. Philadelphia and London: W. B. Saunders Co. 1916. Price 21s.

THE appearance of the eighth edition of this well-known work is a matter for congratulation to the author and his collaborators. Without increasing the size of the book a considerable amount of new matter has been introduced, bringing the text thoroughly up to date. Metric equivalents for the ordinary doses and strengths of solutions have been added. The paragraphs on the field of vision have been amplified,

and give in a few words an excellent account of modern perimetric methods. Many additions have been made to the chapter on operations, and the description of Elliot's operation of sclero-corneal trephining is from the pen of Colonel Elliot himself. Part of the chapter on iritis dealing with autotoxæmia has been rewritten, the shadow test is described by Dr. Edward Jackson, and in the appendix Dr. Smut gives an account of his revised method of X-ray localisation of foreign bodies in the eye.

A feature of the book is the large number of references to recent ophthalmic literature, both European and American, in which ample recognition is given to the work of British ophthalmologists, and it has evidently been the author's aim to keep well abreast of modern progress. In this direction, however, success is apt to be attained at the expense of the personal touch, and the reader occasionally feels that the individuality and the personal experience of the author might have been more freely expressed with advantage.

The print is clear and comfortable to read, the illustrations are excellent, and the index has been compiled with unusually great regard for detail and cross-reference. All that is best in American methods and practice will be found in this volume, and the present edition is sure to appeal to a wide circle of readers, and will be especially welcomed by those who incline towards an up-to-date work in which the latest advances are included with references to the original sources.

The Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose. By ROSS HALL SKILLERN, M.D. Second Edition. Pp. 417. With 287 Illustrations. Philadelphia and London : J. B. Lippincott Co. 1916. Price 21s. net.

THE author is to be congratulated on the publication of the second edition of this valuable work, which has been thoroughly brought up to date. It is profusely illustrated, most of the cuts being original. The anatomical sections are specially rich as regards the rarer anomalies seen in the accessory sinuses, and which are of great help in the clear exposition of the text. To the teacher, more especially, as well as to the operating rhinologist, this treatise will be of great assistance, by bringing him into touch with the literature, both in English and foreign languages.

A full bibliography is given in the form of numbered references at the foot of the page. Professor Skillern divides the subject matter into five parts. He begins with general considerations on the sinuses, taking in turn their anatomy—without going into unnecessary details—development, physiology, pathology, symptoms, and treatment. The bacteriology and vaccine therapy are also considered. A marked feature in this section is that of the differential diagnosis of the various lesions affecting the sinuses, by means of a methodical and well-planned technique

as well as by the use of tables. The use of the nasopharyngoscope is strongly recommended in the diagnosis of disease, more particularly in the posterior group. Under the head of complications the author gives a clear and detailed description of orbital and cerebral infections. Empyemata of the accessory sinuses in children is separately considered with regard to diagnosis and treatment. In the remaining sections diseases of the individual sinuses are taken in detail. Nasal proof puncture and lavage, followed by the insufflation of air, are strongly advocated, but we are surprised that comparatively little is said of the untoward results—even fatal—that may occur in this simple operation, as pointed out by Brown Kelly and others. The various endonasal and external operations are fully described. We note, however, the absence of one or two of the more familiar in this country, such as Watson Williams' endonasal frontal sinus operation. A compilation of the mortalities following the Killian method is given. Prominence is given to the hyperplastic form of ethmoiditis, with its differentiation from the suppurative type and its relationship to concomitant affections, as asthma, etc.

In that part dealing with the sphenoid full acknowledgment is made of Onodi's work. The operations of Hajek, Halle, and Jansen are discussed. We cordially recommend this volume to the favourable consideration of all practising this special branch of surgery.

BOOKS RECEIVED.

- BAINBRIDGE, F. A., and J. A. MENZIES. *Essentials of Physiology*. Second Edition
(Longmans, Green & Co.) 12s. 6d.
- BROCA, A., and E. WARD. *Ligations and Amputations* (J. Wright & Sons, Ltd.) 8s. 6d.
- COBB, I. G. *The Organs of Internal Secretion* (Baillière, Tindall & Cox) 5s.
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(H. K. Lewis & Co., Ltd.) 2s. 6d.
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- FRENKEL, H. S., and L. FREYBERGER. *The Treatment of Tabetic Ataxia*. Second Edition
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EDINBURGH MEDICAL JOURNAL.

MATERNITY AND CHILD WELFARE.

PAPERS CONTRIBUTED TO DISCUSSIONS CONDUCTED UNDER THE
AUSPICES OF THE EDINBURGH PATHOLOGICAL CLUB.

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CHILDREN | R. D. CLARKSON, M.D. |
| IX. SURGICAL TUBERCULOSIS AND CHILD
WELFARE | A. PHILP MITCHELL, M.D. |
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| XIV. DISEASES OF THE EAR, NOSE, AND
THROAT IN RELATION TO CHILD
WELFARE | J. S. FRASER, F.R.C.S. |
| XV. CHILD WELFARE AND THE PREVENTION
OF DENTAL CARIES | J. H. GIBBS, F.R.C.S. |
| XVI. MEDICAL INSPECTION AND SUPER-
VISION OF SCHOOL CHILDREN IN
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MATERNITY AND CHILD WELFARE | W. LESLIE MACKENZIE, M.D. |

I.—FOREWORD.

By J. LORRAIN SMITH, F.R.S.

DURING the present time an effort is being made by public health bodies to devise measures the general purpose of which is to conserve the health and lives of young children. While this movement has been immensely stimulated by reflection on the war and its effects, it has taken shape as a result of recent legislation which empowered local authorities to deal practically with the subject. Up till this point it was left largely to voluntary agencies to carry on the work; the chief defect of voluntary effort in this branch of social service is that it is practically impossible to cover the whole ground by such means. The immediate gain which will follow on the transference of the problem to the care of the public health authorities is that the subject can be dealt with in all its aspects.

The subject will be fully grasped only after investigation from all sides. By means of the statistical records of the public health office it is possible to define the general conditions which are harmful to children. The same conditions are defined from a different point of view in the experience of medical practitioners, and especially in the practice provided in hospitals, dispensaries, and other institutions whose sphere of work includes the illnesses of the children who suffer most.

The families of all classes suffer the illnesses of childhood, but these illnesses generally leave the well-cared-for child unscathed. On the other hand, to the child who is ill-nourished the incident of such simple diseases as measles or whooping-cough too often brings more or less permanent damage, if not death itself.

This difference between the two types of cases need not exist, and it is not too much to expect that increased knowledge and experience on the part of parents and the development of medical organisation for treatment of illness should go far to equalise the burden.

The following discussion deals with the subject from the point of view of medical practice. The papers were read at a series of meetings of the Edinburgh Pathological Club during the

winter session 1916-17, and they embody results of observations and practical suggestions based on the experience of the authors in various branches of medicine.

From these papers it is clear that in Edinburgh much benefit to the community will ensue from the co-ordination of work in child welfare which becomes possible under a municipal scheme. Certain deficiencies in the medical organisations as they are arranged at present are revealed; but this is only what we should expect. The hospitals and dispensaries, many of which are of old standing, were set up and organised without the full consciousness of the sphere of work which the subject of child welfare affords. Certain extensions have become necessary, and in the papers now published each author defines the adaptation required in regard to his subject.

Another aspect of the subject is also kept in view. The success of any infant welfare scheme will be determined by the extent to which it accomplishes the prevention of disease. The child welfare centre is entirely preventive in its work. It is educative for the mothers, and for the child it aims at maintaining steady health and progress. To preserve the child from illness, by care for its diet and other conditions of upbringing, is the primary aim. For this end, maternity consultations for the mothers and dietetic clinics for the babies are carried out with the express purpose of preventing illness by attacking it before it gains a footing. Should prevention fail to be attained, however, the patients will be directed to the family doctor or to the dispensaries or hospitals where the requisite treatment can be undertaken.

To carry out these consultations special training and knowledge are required by the doctors and nurses appointed; an essential part of the scheme will be to make arrangements that will enable those who pass through the Edinburgh Medical School to take full advantage of the opportunities of training which will be afforded. But training is also required on the part of the voluntary assistants and health visitors who work under the direction of the medical officers, and the means of obtaining this will be provided in appropriate courses of instruction in social service.

Finally, the organisation and unification of the work under one scheme will offer opportunities for investigation of many problems. The public health office will obtain systematic records of each case which comes under the scheme. In forming these records there will be the opportunity of obtaining data on all the conditions

which affect the thriving of the children; the health of the parents, and especially of the expectant mother; the safeguarding of the milk supply; the need for open air; the exercise required in the early years; in general, all the precautions required to make the children highly resistant to the effects of illness. Each of these subjects affords problems for thorough investigation, and the increase of knowledge which will be obtained in this way is one of the most important benefits of the scheme.

II.—REPORT OF SPECIAL COMMITTEE ON MATERNITY AND CHILD WELFARE.

GENERAL CONCLUSIONS.

(a) 1. THE consensus of opinion among those who took part in the discussion was that the time is ripe for establishing a comprehensive and systematised scheme for child welfare work.

2. In formulating such a scheme the opinions of medical men and women who have devoted special attention to the requirements of children, both in health and in sickness, will be of value in directing and co-ordinating the measures to be taken to meet the needs of different classes of children.

3. New machinery and an increased number of workers will be required; this will entail expense which must be faced.

(b) 1. Recent legislation (1915) regarding the notification of birth, and the associated work of Health Visitors, acting in co-operation with the local Public Health authorities, deals with expectant mothers and babies from birth up to five years of age.

2. The medical inspection (and treatment) of school children by School Board authorities applies to those of five years old and upwards.

3. The object of a complete system of child welfare should be to include the expectant mother and the child, and keep in touch with the child through infancy and on till the time when it comes under the care of the education authorities, who are then responsible for it during school life. The different stages should be so co-ordinated that there is neither interruption nor overlapping in the supervision of the individual child. At present the most pressing need is for the child between the ages of one and five.

4. Care must be taken that the agencies at work do not encroach upon the duties of parents, or involve unnecessary intrusion on the home. They should be essentially advisory and helpful rather than minatory or coercive. The arrangements made should be as economical as possible, both of labour and of money, and the machinery should, as far as is practicable, be concentrated in one building in each district of the city.

(c) 1. The medical inspection of school children has shown an

unexpected prevalence of *physical defects* amongst children. All authorities recognise that many of these defects are preventible, and that their prevention would involve less expenditure of time, labour, and money than their alleviation.

2. The first step towards ensuring healthy offspring is to secure the health of the parents, and the supervision of child life should commence before the child is born into the world. Much can be done for the mother and her unborn child by wise guidance during the period of pregnancy, and the early recognition of danger may save the life of one or of both. This is especially true in cases of syphilitic infection, in which great benefit results from treatment during pregnancy. When it is remembered that enormous numbers of premature and still-births, and many deaths soon after birth, are due to congenital syphilitic infection, and that a large proportion of the blind and deaf owe their deficiencies to the same cause, the importance of antenatal treatment becomes obvious, and even if it does not prevent infection of the child, can do much to lessen the effects of this disease.

3. Pre-maternity and maternity supervision has many other advantages. Such supervision may be largely instrumental in preventing ophthalmia neonatorum, which is such a prolific cause of blindness, and it fosters in the mother the desire to suckle her child and thereby saves the infant from many dangers.

4. After birth, guidance and aid in baby care and baby feeding diminish the risks of digestive trouble, obviate the causes that give rise to rickets, and enable the infant to gain a sure foothold on life.

5. As the staple food of early childhood is cow's milk, the purity of the milk supply is of paramount importance in preventing disease; and in devising any scheme of child welfare a supply of pure and good milk is one of the first considerations. Every medical man voices the demand for this. It is here only necessary to quote figures relating to infection by one type of micro-organism in this locality. In the surgical wards of the Royal Edinburgh Hospital for Sick Children it is not uncommon to find 50 per cent. of the cases suffering from tuberculosis. The great bulk of these are cases of tuberculosis affecting the glands, bones, and joints. It was recently found that in Edinburgh living tubercle bacilli were present in 20 per cent. of samples of dairy milk, and that 90 per cent. of cases of tuberculous cervical glands and 60 per cent. of cases of bone and joint tuberculosis in young children were due to infection by a bacillus of the bovine type.

6. The reawakening of the national conscience with regard to vaccination is a matter of vital importance. Statistics show that in Edinburgh, for example, there is a gradually and rapidly increasing percentage of school children unvaccinated. This state of affairs is a standing menace, not only to children, but to the whole community.

(d) The discussions on which this Report is based dealt chiefly with the medical aspects of child welfare, but the whole movement is closely bound up with many practical social questions, of which the most important are the housing problem, the control of venereal disease, and the problem of drink.

In his paper on "The Influence of Housing on Health," read before the Scottish Labour Housing Association at Glasgow, 3rd January 1917, Dr Maxwell Williamson deals fully with that subject. In the summary at the close of his paper he states, in his final sentence, "That Town Planning Schemes should be proceeded with among the first operations to be carried out after the war; that old property should be ruthlessly condemned, and that in the provision of new habitations special regard should be paid to the proved health advantages in connection with colony dwellings, and specially to the experience gathered by the operations of such a body as the Peabody Trust in providing accommodation on a large scale for workers in London."

As regards the control of venereal disease, the Public Health (Venereal Diseases) Regulations (Scotland), 1916, dated 26th October 1916, when in action will be intimately associated with, and will contribute greatly to the success of, any scheme of maternity and child welfare.

The problem of the prohibition or limitation of excessive alcoholic indulgence and of the means whereby this can best be carried out, is also cognate to the general subject under consideration, and a solution of it appears to have recently become appreciably nearer.

APPENDIX.—DETAILS REGARDING THE WORK OF A CHILD WELFARE SCHEME.

The following schematic diagram indicates the various agencies at work in a comprehensive scheme for child welfare, and the manner in which they are co-ordinated. This scheme, so far as treatment is concerned, and at each stage, will secure that patients who have family doctors will be referred to their care.

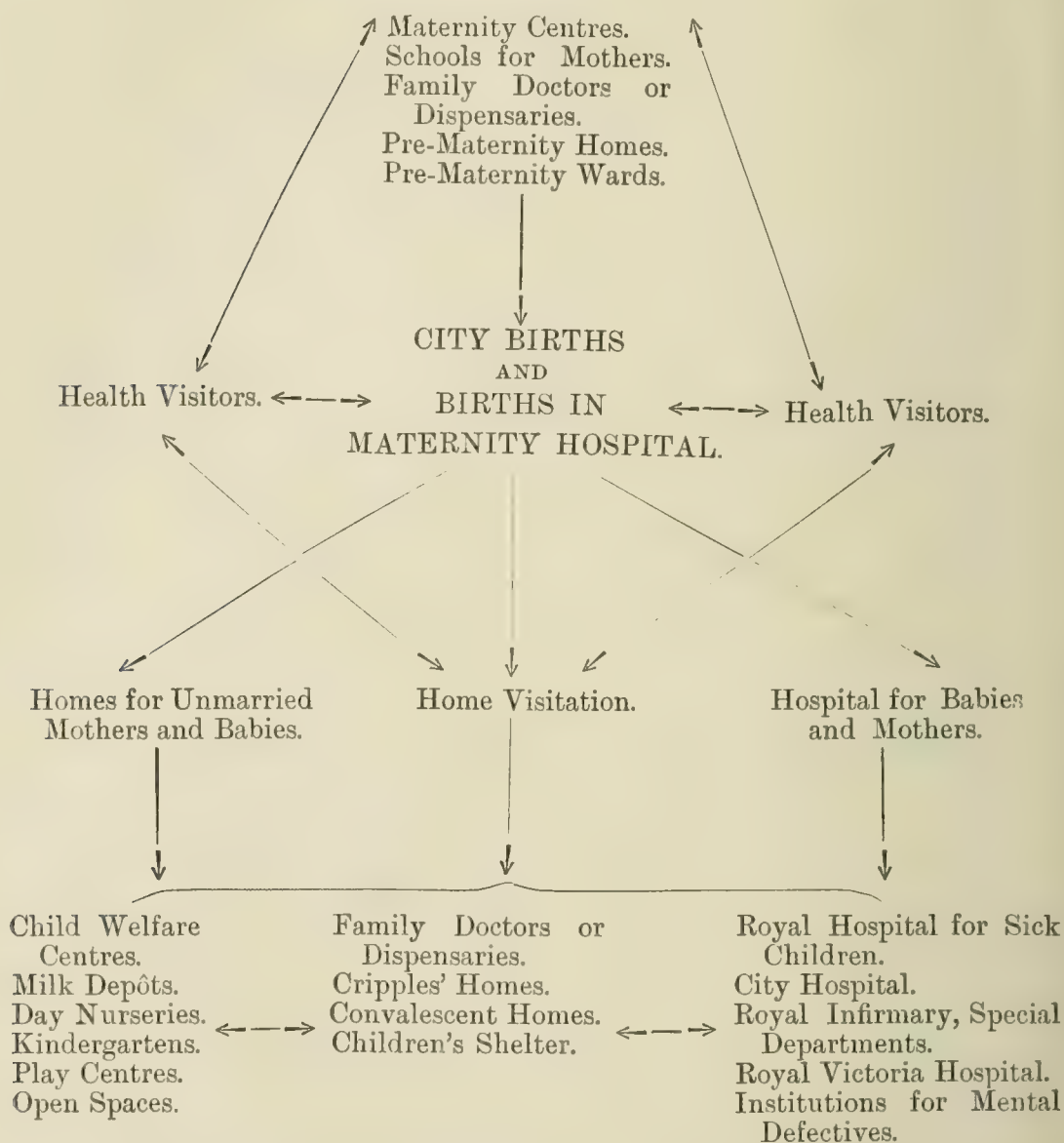
PUBLIC HEALTH COMMITTEE

AND

MEDICAL OFFICER OF HEALTH.

SPECIAL MEDICAL SUPERINTENDENT.

ANTENATAL HOME VISITATION.



SCHOOL BOARD.

Medical Inspection and Treatment after 5 years of age.

HEALTH VISITORS.—The function of the health visitor is to guide the mother with regard to the particular agency or institution connected with the scheme which is suited to meet the requirements of herself or her child, *e.g.* the local child welfare centre, the maternity centre, dispensary, etc. The visitor who has received training may also instruct the mother in simple matters relating to health, or in the management of children during convalescence.

PREVENTIVE AGENCIES.—(*Schools for Mothers, Maternity Centres, Child Welfare Centres.*)

At a *School for Mothers*, the instruction embraces the subjects of cookery, sewing, dressmaking, laundry work, sick-nursing, simple facts about baby feeding and dietetics, and talks on home remedies for minor ailments. Already, in many localities, School Boards have arranged schools for mothers as part of their continuation class system. But, as stated in the memorandum of the Local Government Board on the subject of Child Welfare, "This system will not, of course, in any way preclude such instruction at Infant Consultation Centres or Maternity Centres as the officers of those institutions may consider desirable, either in the form of individual advice or of class instruction. Such informal instruction will, in fact, be a normal part of the administration of those centres, and will be covered by any grants that may be made in respect of the institution as a whole."

To a *Maternity Centre* expectant and nursing mothers and young infants may come to receive advice. The suggestion here made with regard to maternity centres is that they should be open once or twice weekly at a fixed hour, when a qualified practitioner and a C.M.B. nurse would be present, that any pregnant woman visiting should be thoroughly examined and advised and guided according to conditions found.

At *Child Welfare Centres* preventive work among mothers and children up to school age would be undertaken. At the centre the child will be examined at regular intervals, advice given as to diet, clothing, etc. In addition to the doctor, a nurse or health visitor will be present at the clinique, and will visit the home of the child to see that the instruction given has been understood and is being carried out. Great stress is laid upon the importance of the development of child welfare centres in populous poor districts.

CURATIVE AGENCIES.—(*Child Dispensaries, Convalescent Homes, Cripples' Homes, Institutions for Mentally Defective Children, etc.*)

In a large city it is desirable that *Dispensary* treatment should be available at various localities to obviate the necessity of a mother having to go herself, or to take her sick child a considerable distance, and to wait in the crowded out-patient department of a hospital. Special clinics held at the existing dispensaries would to a large extent meet the case, but it would be preferable if this work could be carried on in the same building.

With regard to *Convalescent Homes*, the opinion is unanimous that much increased accommodation is urgently required. After measles and whooping-cough, for example, a period of convalescence in suitable surroundings would prevent many of the pulmonary, tuberculous, and other complications which so often follow these diseases when the child is left to convalesce in its home. Children suffering from chronic diseases of the ear, nose, and throat also would derive great benefit from treatment in a convalescent home. This is especially true of children with "running ears," and those who have been operated upon for adenoids or enlarged tonsils.

Increased accommodation is also urgently required in *Cripples' Homes*.

The want of sufficient residential institutions for mentally defective children is also widely felt, this lack being the weak part of the Mental Deficiency and Lunacy (Scotland) Act, 1913.

SEPARATION OF PREVENTIVE AND CURATIVE AGENCIES.—As it is undesirable that healthy and sick children should be gathered together in large numbers, an effort at differentiation should be made between the healthy children visiting local health centres for examination and supervision and sick children attending at local dispensaries for treatment.

It will frequently happen, however, that a child visiting a health centre is found to be suffering from a minor complaint necessitating advice or treatment at a dispensary. It is therefore highly desirable, to avoid the necessity for repeated visits, that the dispensary clinic should be in the same building, or at least in the immediate vicinity of the health centre, and that attendance should be given in the two departments at or about the same time.

For the same reasons the local maternity centre should be conjoined with the health centres and local dispensaries.

To explain the nature and function of (1) the preventive and (2) the curative agencies, the following three schemes may be useful:—

Healthy Mother and Child.

Pregnancy—Voluntary Notification.

- Home Visitation.
1. Visit to local Maternity Centre ; thorough physical examination.
 2. Attendance at local School for Mothers.
 3. Aid before and at labour.
 4. Attendance of mother and child at Child Welfare Centre. (Provision of suitable milk, if necessary.)

"Sick" Mother.

Pregnancy—Voluntary Notification.

- Home Visitation.
1. Visit to local Maternity Centre ; thorough physical examination.
Found to be "sick."
 2. Referred to family doctor or local Dispensary.
 3. Cured by Dispensary and referred back to local Maternity Centre ;
or,
Found to be serious case and referred to Pre-Maternity Department of Royal Maternity Hospital.

"Sick" Child.

- Home Visitation.
Provision of Suitable Milk, if necessary.
1. "Sickness" occurs while attending, or is discovered at, local Child Welfare Centre.
 2. Referred to family doctor or local Dispensary.
 3. Cured and referred back to Child Welfare Centre ;
or,
Found to be serious case and referred for consultation or admission to Hospital.
 4. On quitting Hospital sent to Convalescent Home or Cripples' Home, etc.
 5. On quitting Convalescent Home referred back to local Child Welfare Centre.

An essential part of a child welfare scheme is a hospital for mothers and young infants—a “babies’ hospital.”

In many cases the only chance of recovery for a premature or for a sick infant consists in careful feeding and nursing. For both reasons he ought to remain with his mother, and be under the closest supervision. He ought, if possible, to be fed upon maternal milk, and he requires constant nursing.

A sick baby requires a great deal of womanly attention, a great deal of “nursing.” He demands almost the whole attention of one woman. In a general children’s hospital he cannot get it, but in a “babies’ hospital,” or in a babies’ wing to a children’s hospital, accommodation would be made for nursing mothers, and also for numbers of nursemaids. Into such a department admission would, of course, be granted quite irrespective of the legitimacy of the baby.

But special machinery is necessary for dealing with the healthy unmarried mother and her healthy baby, and particularly for the mother with her first baby, as undoubtedly it is in these cases that preventive work is of most avail. Many of these mothers are in a hopelessly difficult position on leaving the maternity hospital, and aid, such as is given, by reception into a small home where they are suitably cared for, suitably occupied, and nurse their own babies for some months, preserves health, develops mother-love, facilitates re-entry into a practical world, and offers at least a first step towards justice for the baby.

Finally, the wider development of mother and child welfare work is certain to offer opportunities of medical research work in various fields as yet largely unstudied.

In name of the Committee,

A. DINGWALL FORDYCE,
Convener.

III.—THE SCOPE OF PREVENTIVE WORK IN CONNECTION WITH THE MEDICAL TREATMENT OF INFANTS AND YOUNG CHILDREN.

By MRS. J. C. JOHNSTON, M.D.

I HAVE much pleasure in opening the discussion on Child Welfare by outlining the scope of preventive work from the point of view of the Infant Health Centres. I have been in contact with the problem of infantile mortality in Edinburgh for the past two years through the practical work of the Health Centres, and I shall try to put before you certain things which seem to me and to my associates of paramount importance in dealing with child welfare on the lines laid down by the Local Government Board Memorandum last March.

The problem you are familiar with: a city that ought to be one of the healthiest in the world, ideally situated, swept by sea winds, a good water supply, no extremes of heat or cold, with no areas given up to alien peoples, no marshes, no mosquitoes, few flies, well off for wide streets and open spaces, comparatively free from the hoof-prints of ramping industrialism, this city, where Lister walked and talked, has a mortality rate in the first year of life of close on 15 per cent. in certain districts, ranging around 12 per cent. as an average for a number of other districts, and showing an inclination to go higher.

So far from any admission of responsibility, the world was called to witness in 1913 how wonderful a city was Edinburgh, where during that year, over all the city, only ten babies in 100 births had perished before they were a year old. And yet in that same 1913 the infantile mortality rate in St. Giles ward reached 142 per thousand births; St. Stephen's and George Square followed with 135 and 125; and it is not improbable that to-day the figure for half Edinburgh is not far off the maximum of those three.

In the autumn of 1914 steps were taken to start Infant Consultations for malnutrition and its prevention after the model of the so-called "Schools for Mothers" of Manchester and London. Since that time eight consultations per week have been put in operation, four doctors dividing the work, two fully qualified

nurse-superintendents, and a staff of assistants. We have barely scratched the surface of a limited area, but we have gone far enough to see the futility of half measures. Ounces of prevention are worth uncommon little, except in the proverb.

There is only one solution—a scheme of prevention designed and made to *prevent* certain definite things: for what are the diseases from which these infants die? Figures from the consultations are of no value at present, but the tables of in-patients dying at the Sick Children's Hospital throw a certain amount of light upon relative causes and ages, though not all the children admitted to the hospital belong to Edinburgh.

The Report for 1914 shows 231 in-patients on the medical side dying under 5: 115 were under 1 year, 116 between 1 and 5; 160 of these fall into groups, and they are evenly divided, 80 under 1 year, 80 between 1 and 5.

The groups run thus:—

	Under 1 year.	Between 1 and 5.
Malnutrition and marasmus	26	5
Vomiting and diarrhœa	25	3
Congenital syphilis	9	...
Tuberculosis of various forms	10	42
Respiratory conditions: Pneumonia, bronchitis	10	30

In 1915, in 208 fatal cases, much the same disease and age relation is shown, though rather a larger number, 111, were under 1 year, 97 between 1 and 5. Marasmus and gastro-enteritis, again, belong to the first year, tuberculosis and pneumonia largely between 1 and 5.

So far as hospital losses go, there seems a certain balance between the totals under 1 year and the totals between 1 and 5; the comparative absence of the fatal digestive disorders being made up by the increase of pneumonia and tuberculosis in the older children. Of course hospital figures include none, or very few, of the babies who die in the first few days of life. These must be reckoned as well, beside the number born dead, and that greater number yet of the uncounted who do not appear in any mortality lists at all—the dead *in utero*.

Out of this survey emerge four things toward which an adequate scheme of prevention should direct its aim:—

1. To attack inanition, malnutrition, and marasmus at their source—that is to say, to investigate nutrition from the standpoint of the infant's earliest needs both in intra-uterine and extra-uterine life.

2. To seek out the sources of gastro-enteritis and diarrhoea.
3. To discover some means of protecting the infant and young child from tuberculous infection.

4. To fortify the child against other and repeated infections of the respiratory tract as it begins to walk and onward.

Are any of these impossible of achievement with the aid of the pathologist and bacteriologist, given sufficient thoroughness and definiteness of organisation?

The first step toward a serious attempt to carry out such a programme would be to bring the Infant Consultation within the reach of every mother, and to converge upon it the best assistance that can be had in determining how to help the child to adapt itself to its surroundings while in comparative health, and how to avoid the certain dangers ahead and to increase its resistance to them. Instead of the name Infant Consultations it might simplify matters to call them Dietetic Clinics as defining their function more exactly.

They should be housed in well-lighted, well-warmed, and airy rooms, with plenty of comfortable low seats and a place for the waiting prams. One small room should be reserved where the nurse may see a new baby when necessary, so that a suspicious cough or rash need not spread alarm, while the mother of a baby definitely ill, if she has no doctor, is told of a treatment hour under the same roof or sent to the nearest dispensary. A large room with convenient weighing arrangements, tables for registers and for demonstrations, must have space for talking to the mothers one at a time; the doctor's room besides, and another small one for supplies.

The business of the clinic is the nutrition of the child, its food supply, environment, clothing, etc., and its rate of growth and development. The earlier in its life the child is brought the better, and a Dietetic Clinic must necessarily be in touch with the maternity nurses of the district. An ante-partum clinic should be held in the same place at a different hour, with a dental service for expectant and nursing mothers.

The conservation of breast-feeding, it goes without saying, is one of the first objects of the Dietetic Clinic, and it will take much effort in education, both of nurses and mothers, to bridge that dangerous gap between the last visit of the maternity nurse to the mother and the first visit of the mother to the clinic, so often marked by abandonment of breast-feeding. Test feeds, temporary supplementary feeds, milk tests, the modus of helping a return of

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the milk, all these belong to the routine of the clinics, as well as the serious task of determining sources of early infection—an unsatisfactory umbilicus, for example. A small feeding ward, or, better still, a house with several small wards, two or three cots in each, for in-patient study of malnutrition, with a milk laboratory equipped with a staff of trained investigators, is an essential, if the difficult bottle-fed cases under three months are to have a chance for life. In such a ward definite experiments could be observed, and formulæ and preparations recommended to the clinics.

Unthriving cases at the clinics will tax the patience of all three—mother, doctor, and nurse—but the results are often astonishing considering the conditions. Almost invariably the mother is a staunch ally, ready for anything for the sake of the child. It is perfectly possible, with a little trouble, to get the mother's consent to a Wassermann test either of her own blood or that of the child, and I wish to emphasise how valuable this test might be if done sufficiently often to remove much of the suspicion attached to the process. In certain cases at our Centres where there has been no specific history obtainable and an absence of symptoms in the baby, except malnutrition, we have found the Wassermann test from the mother return positive, even strongly positive. This opens up a far-reaching vista. The question arises: Given a positive Wassermann in a mother without symptoms, with a justifiable presumption that she was positive while carrying the child, is it not that child's right to-day to be treated by something of more accurate dosage than Hydrarg. c. cretâ *before* serious symptoms arise? My experience during the last two years leads me to believe that there are numbers of totally unsuspected cases of syphilis of child-bearing age on every side, as well as the cases we do suspect with one child or more dead-born. As to these last, in a series recently compiled, of only 207 births there were 14 dead-born. What about the next baby?

The second aim of our preventive scheme, to seek out the sources of infectious diarrhœa, belongs to the Dietetic Clinic in so far as that infection is a question of food contamination and inexcusable filth. The preventive remedy is education in essential cleanliness and in the danger of neglecting the beginnings of trouble. There is, however, that source of infection for which the mother is not responsible—the milk supply—which, in this city, is open to criticism of methods of handling as well as under grave suspicion of being the source of the scourge of tuberculous glands, mesenteric and other, as the staff of the Sick Children's has so

often pointed out. It is difficult for me to speak dispassionately of the milk supply of Edinburgh. One feels the need of figurative language and of images such as were associated in childish imagination with the plague. I have been in some of the city's byres, and have seen what happens all the way from them to the open jug in grimy little hands feeling their way up unspeakable stairs. Yet the innumerable chances of contamination in the handling of unchilled milk, standing in open pans, doled out in open jugs, deplorable as they are in the light of modern methods, sink into insignificance compared with the tragedy of tubercle-infected milk. A first baby in its mother's arms, not yet a year old, with swollen glands in the neck, or with the products of suppurating mesenteric glands pouring from the umbilicus, or with disease of tiny bones, all these I have seen in the last few months at the Infant Centres. Victims so young I have never seen in any other city.

The third aim of preventive work—the protection of infants and young children from tuberculous infection—is it a possible achievement? Why not, when we know the source? Certainly one long step in finding a way will be taken when the public learns to demand tubercle-free milk. Boiling the milk, as long as the present state of affairs exists, is the only way, of course, and must be taught in season and out at the clinics, but it is a confession of failure to prevent.

As for the human sources of tuberculous infection and how best to combat them, pediatricists of great experience in the study of tuberculosis in children tell us that every child born of a tuberculous mother, who cares for and handles the child, or living in contact with a person who has an active lesion, will have tuberculosis. There are, however, investigators firmly convinced that immunity can be obtained if the child is treated as having the infection early enough. I am incompetent to quote their opinion, but what I plead for is isolation of the problem from the general scheme of routine tuberculosis work. These children are doomed, but we know that it often takes a considerable time to get the first proof of infection. Surely the last word has not been said in immunity and acquired resistance. The feeding of children in contact with tuberculous infection might be a special line at clinics, and case notes and weight cards kept to an older period.

The fourth aim mentioned above includes the prevention of the after-effects of zymotic diseases as well as general prophylaxis

in relation to infections of the air-passages other than tuberculosis, mostly in children over a year. Nutrition, again, plays a large part. But will you consider for a moment how close these little people are to the floor during their first year of walking, and where they spend a large part of the day in the crowded districts? Would it not be of incalculable advantage if the authorities took over the cleaning and ventilation of common stairs, so that the house door might open on fresh air and a dust and dirt-free landing?—the stair to become part of the pavement, to be kept for the safety and convenience of the public. The Augean stables were cleansed; and the holds of ships are successfully ventilated.

A necessary part of a systematic and serious effort to stop the wastage of infant and child life must be a convalescent home or homes a little way out of the city on a site sloping to the south and west, preferably a collection of bungalows with open-air shelters in abundance. Feeding cases are notoriously difficult to handle in hospital for any length of time. Digestive disorders in older children, rickets, chronic bronchial conditions, and many of the children recovering from measles, whooping-cough, and pneumonia, would get the start that makes all the difference to their lives by four weeks or more in such a home at the critical period. Run in small nurseries combined with the training of children's nurses, with kindergartens attached for the stronger ones, it ought not to be a too expensive part of a preventive scheme.

The clinic established for nutrition and prevention will not interfere with the treatment of sick babies at the Dispensaries and in Out-patient Departments; minor operative work, circumcisions, adenoids and tonsils, and hernias will be directed as usual, only earlier.

To recapitulate: an efficient scheme of prevention must be directed at the definite diseases and conditions which combine to destroy life in the very young—syphilis, tuberculosis, and bad feeding—and whatever contributes to these three.

The Dietetic Clinic to be the centre of preventive industry, linked with maternity work on the one side, with dispensary and hospital treatment on the other.

The Dietetic Clinic to be aided and abetted by a feeding ward equipped with milk laboratories.

The Dietetic Clinic to be in touch with generous provision for convalescence from acute disorders or chronic conditions.

One further word may be said of the value of this clinic

from the point of view of the mother. The fact that definite co-operation is demanded by regular attendance, and evidence of the carrying out of instruction expected, has great educational possibilities. The teaching is concrete—the food, the clothes, the habits of the particular child—and the interest and sympathy of the mothers, not in their own child only but in the progress of every child, is a wholesome influence.

One hears that too familiar word *compulsion* used now and again in connection with welfare schemes—"the mother will be *compelled* to take her child to the Centres," etc. It will do no harm to remember that that is a word of very limited application in modern Britain. A mother can be compelled only when criminal neglect is proved, and there are already agencies to deal with that situation both before and after. Preventive work is a question of persuasion, not compulsion, and the drawing force is the interest in the child. The exception might be in the case of boarded-out babies, and then it would be part of the agreement to take the child at intervals to the clinic.

An interesting thing is reported from New York, anticipating the figures for 1916 in infantile mortality. A marked rise in the rate was expected owing to the ravages of infantile paralysis. Already it is announced that the rate has fallen, not risen, and why? Because never before has such care been taken nor such watchfulness been exercised. And in this country, in Scotland, here, in Edinburgh, a rate lower by one half than ever before is not only possible, I believe probable, within the next few years. We shall turn to life and to little growing things, for that way lies the healing of the nations.

IV.—THE CARE OF CHILDREN OF THE SCHOOL AGES.

By L. D. CRUICKSHANK, M.D.

IT is now seven years since medical inspection became universal in Scotland; it was established under the powers conferred by the Education (Scotland) Act, 1908. Under that Act, however, School Boards had no power to provide treatment out of the school funds, and it was not until 1913 that an Act was passed which gave them that power. The disabilities under which the school medical service laboured, in consequence of the limited powers conferred by the 1908 Act, to some extent account for the somewhat tardy development of this important branch of the public health service. Nor did the Act of 1913 entirely remove these disabilities, and it is perhaps desirable that I should point out what some of these disabilities are.

1. As most of you probably already know, the School Board is not the only public education authority in Scotland. Under the Act of 1908 there was established what is known as a Secondary Education Committee in each of the counties and principal towns. This committee has certain important educational duties to perform, and there is placed at its disposal in each year a certain sum of money from what is called the Education (Scotland) Fund. When medical inspection was introduced it was decided that, although the duty of providing for medical inspection lay upon the individual School Boards, that duty should be delegated by the School Boards to the Secondary Education Committees so that the system of inspection might be organised on a county basis and entrusted to whole-time officers. In the principal towns the areas of the School Boards and the Secondary Education Committees are coterminous, and the School Boards were accordingly allowed to make their own arrangements. In every case, half the cost of medical inspection is paid by the School Boards, the other half being paid out of the funds of the Secondary Education Committee.

On the other hand, medical treatment which was begun in 1913 was left in the hands of individual School Boards, and the cost is met, half by the School Board and half by a special grant from the Treasury.

Here there is a financial complication which necessitates a clear distinction being made—on paper at least—between medical inspection and medical treatment.

2. When the medical inspection appointments were made none of the medical officers came under any obligation as regards medical treatment, and in many districts in Scotland individual School Boards have schemes for the medical treatment of school children which are carried on more or less independently of medical inspection, without any control or direction on the part of the school medical inspectors, and sometimes even without their knowledge. Here is a very serious defect in organisation which gives rise to inefficiency and a great amount of leakage between inspection and treatment.

3. Medical inspection provides for the examination of all school children. Medical treatment at the cost of the public funds, on the other hand, is restricted to the children of necessitous parents, and the standard of necessity is determined by each individual Board, with the result that widely varying standards are adopted in different districts.

Here then are three serious defects—financial complexity, defective organisation, and anomalies in the selection of children in need of treatment—which make the establishment of a thoroughly efficient scheme of child welfare for children of the school ages a matter of serious practical difficulty, at any rate in the rural districts. In the burghs, where medical inspection and medical treatment are under a single authority, these disabilities are felt much less acutely and do not offer the same obstacles to efficiency.

Having set out the deficiencies of the system we may now pass on to consider briefly the scope and purpose of—(1) medical inspection; (2) medical treatment; and (3) a suggested ideal organisation for the inspection, treatment, and supervision of defective children.

(A) MEDICAL INSPECTION.

There are 41 separate schemes of inspection, 30 for the counties, 6 of which are combined in pairs, and 11 for the larger burghs.

The pre-war establishment of the medical inspection service, as apart from medical treatment, was 110 medical officers and 56 whole-time school nurses. Fourteen of the medical officers were supervising officers only, the supervising officer in each case

CONFIDENTIAL.		1st Examination (Entrance).	2nd Examination — 8	3rd Examination — 11	4th Examination — 13
1. Date of Examination					
2. Class and Regularity of Attendance					
3. Age of Child					
4. Height					
5. Weight					
6. Clothing and Footgear		C... S... R... F...	C... S... R... F...	C... S... R... F...	C... S... R... F...
7. Nutrition					
8. Cleanliness and Condition of Skin	{ Head Body				
8a. Vaccination					
9. Teeth					
10. Nose and Throat {	Tonsils	R..... L.....	R..... L.....	R..... L.....	R..... L.....
	Adenoids				
	Submax and Cervical Glands	R..... L.....	R..... L.....	R..... L.....	R..... L.....
11. External Eye Disease					
12. Vision {	Right	Glasses.	Glasses.	Glasses.	Glasses.
	Left				
	Both				
13. Ear Disease					
14. Hearing		R..... L.....	R..... L.....	R..... L.....	R..... L.....
15. Speech					
16. Mental Condition					
17. Heart and Circulation	{				
18. Lungs	{				
19. Nervous System					
20. Tuberculosis					
21. Rickets					
22. Deformities					
Spinal Diseases					
23. Infectious or Contagious Diseases					
24. Other Diseases or Defects {					
25. School Clinic		F.Ex.... A.C....	F.Ex.... A.C....	F.Ex.... A.C....	F.Ex.... A.C....
26. Nurse to Visit					
27. Letter to Parent					
28. Letter to Doctor		O.L.... C.L....	O.L.... C.L....	O.L.... C.L....	O.L.... C.L....
29. Result of S.M.E.					
30. Excluded					
Parents present					
S.M.O.'s Initials					

being the County Medical Officer of Health; 68 were whole-time officers, and 24 were part-time officers. Apart from the 56 whole-time nurses there were many part-time nurses and nurses engaged wholly in the special schools and in treatment centres.

Medical inspection as at present organised makes provision among other things for—

1. The systematic medical examination, according to a prescribed schedule,* of three age-groups, namely, entrants, leavers, and an intermediate age-group, usually children aged nine. Every child is thus systematically examined three times during school life.

2. The re-examination of all defectives and of special cases selected from the intervening age-groups.

3. The following up, by school nurses, of all children reported as defective, to ascertain what action the parents or guardians may have taken, and in cases of neglect to induce parents to obtain the necessary treatment.

These are what may be termed the primary duties of the medical inspector so far as medical inspection pure and simple is concerned; and although many other duties fall to him to perform, he is often precluded from giving proper attention to them on account of the amount of work involved in systematic medical inspection.

In populous centres the re-examination of defective children and of special cases usually involves the establishment of a special inspection clinic. Such a centre serves a very excellent purpose. It economises the doctor's time, it provides greater facilities for the more detailed clinical examination of difficult cases, sometimes by specialists appointed for the purpose, and enables parents, teachers, attendance officers, and nurses to get into touch readily with the medical inspector. I shall refer later and in more detail to the scope and purpose of this Inspection Clinic. For the present it is sufficient to observe that it does not take the place of, but supplements, the regular visits to schools for systematic inspection.

Over 400,000 children are examined annually in Scotland. These examinations are, on the whole, very well done. Owing, however, to the varying methods of classification employed, the statistical returns for the first few years were very unreliable; but in August 1914 the Scotch Education Department issued a circular suggesting a uniform method of classification, and it is hoped that future returns will be of much greater value.

* For specimen schedule, see pp. 238, 239.

So far medical inspection has shown the prevalence of defects to be approximately as follows:—

Defective vision	10 per cent.
Defective hearing	5 „
Diseases of ear	3 „
Marked decay of teeth	50 „
(some decay 80 to 90 per cent.)	
Malnutrition	10 „
Ringworm	1 „
Tuberculosis	Doubtful.

(B) MEDICAL TREATMENT.

Medical treatment is of very recent development. It was begun in a small way towards the close of 1912 under a special Treasury grant of £7500. After the passing of the Education (Scotland) Act, 1913, which gave School Boards power to provide treatment, the development of treatment schemes proceeded with gratifying rapidity, and but for the war they would probably have been much more numerous and more comprehensive than they are to-day. But even under war conditions there has been some extension of the work.

The total number of school children treated at the public expense in 1915 was 50,000, the defects being—

Defective teeth	20,000
Defective vision	5,000
Diseases of the eyes	7,000
Diseases of the ear	4,000
Tonsils and adenoids	170
Diseases of the skin	9,000
Other ailments	5,000

These figures show an increase of 12,000 as compared with 1914, and represent more than double the number treated in 1913. It seems likely, however, that as the result of the war and the renewed interest in child welfare aroused by it, there will be a rapid extension of treatment schemes on the cessation of hostilities.

In Scotland at present there are about 60 school clinics in operation. Many of these confine their operations to the treatment of defective teeth and defective vision. It is only in the large towns that the clinics are open regularly and have their departments adequately staffed; and even in these cases there

are certain classes of ailment for which adequate provision has not yet been made. For example, there are only 5 clinics in which specialists are engaged for the treatment of diseases of the ear, nose, and throat, and 4 in which skin specialists are employed.

Apart, however, from the clinics there are a great many cases in which treatment is provided without the establishment of a special treatment centre.

To sum up: We at present possess a system of inspection which provides for the inspection of all children of the school ages and a system of treatment that provides for a limited number of necessitous children—not for all necessitous children, nor for every form of ailment from which they suffer. In addition, a somewhat unsystematic attempt has been made on the part of the larger School Boards to provide, in special schools and classes, educational facilities for children unsuited for the ordinary school.

Taken together, in their present state of development these measures can hardly be said to constitute an adequate scheme of child welfare for the children of the school ages, but they represent the groundwork of a satisfactory scheme.

At present, so far as ailing children are concerned, these measures are inadequate mainly through—(1) defective organisation; (2) a serious limitation of the facilities for medical, surgical, and dental treatment; and (3) inadequate special school provision for children unsuited for the ordinary school; and so far as all school children—healthy and unhealthy—are concerned they are inadequate because their aim is mainly curative, and only indirectly preventive, and thus they affect only the few; whereas the broad general purpose in every scheme of child welfare for children of the school ages should be to supervise the growth and development of all children.

(C) SUGGESTED IDEAL ORGANISATION FOR THE INSPECTION,
TREATMENT, AND SUPERVISION OF DEFECTIVE CHILDREN.

It is desirable in the interests of school children that medical inspection and treatment should be regarded as having a unity of purpose, and that every facility should be afforded for a ready passage of children from “inspection” to “treatment” without undue waste of time or leakage. It will be convenient, therefore, to take the School Clinic as the basis of our observations, for the principles that govern its successful management are such as should be applied to all schemes, however limited, for the medical care of school children. It will generally be found that medical

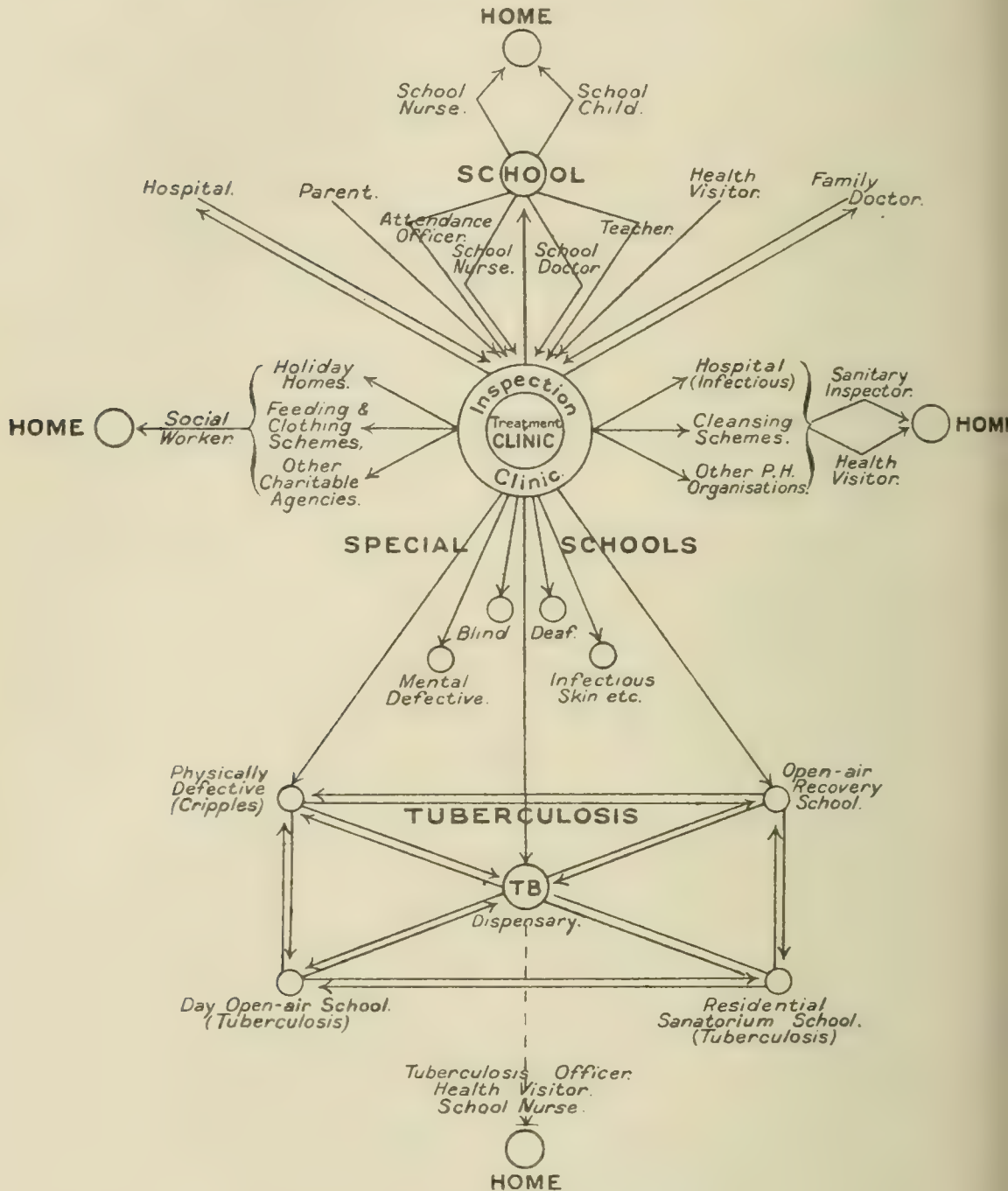
treatment administered to the extent which that term generally implies by no means completes the whole of the treatment of which the child may stand in need. Indeed, in the chronic ailments from which school children so frequently suffer the purely "medical" part of the treatment may not always be the most important, and various additional procedures may have to be adopted. Whatever form these additional procedures may take, whether it be the provision of food or clothing, open-air treatment in holiday homes, education in special schools, modification of the curriculum of the ordinary school, the practice of special respiratory or corrective exercises, or attention to some particular point in the personal hygiene of the people—whatever the supplement that is needed to render "medical" treatment effective, that supplement can best be provided through the medium of the school medical service. But to be effective this work must be organised, and experience would appear to show that it can be most effectively organised through the medium of a school clinic.

A fully organised school clinic is generally regarded as fulfilling the two main functions of "Inspection" and "Treatment." Briefly, an *inspection clinic* may be said to provide for the following:—

- (a) A more detailed examination of cases that could not be fully examined in school.
- (b) The examination, and, if necessary, the repeated re-examination of special cases to determine (1) whether any modification of the school life of the pupils concerned is necessary; (2) whether they should be excluded from school; or (3) referred to a special school; or (4) referred for treatment, etc.
- (c) The periodic supervision of children suffering from chronic ailments, such as ringworm, tuberculosis, etc.
- (d) The systematic supervision and control of supplementary treatment or after-treatment, whether educational or hygienic, of children who are receiving or have received medical treatment.
- (e) The inspection prior to their re-admission to school of children excluded from school on account of infectious diseases.

The work of a *treatment clinic* naturally divides itself into departments. Certain diseases do not require to be actually treated at the hands of medical men, but can be dealt with by

nurses working under medical supervision. Other diseases demand the attention of specialists, such as dentists, oculists, and surgeons, etc., hence several departments of work emerge. A treatment



clinic may therefore embrace any or all of the following departments:—

1. A dental department.
2. An ophthalmic department.
3. An ear, nose, and throat department.

4. A skin department.
5. An operative department.
6. An orthopædic department.

Such a combined clinic serves as an excellent administrative centre from which to correlate the work of the school medical service with the special schools, and with public health and voluntary agencies, whose objects are of an ameliorative character. In the accompanying chart* (p. 344) an effort has been made to show in graphic form the position that such a clinic might occupy as a centre of school health administration. The central ring represents the treatment clinic surrounded by the inspection clinic, through which children requiring treatment will naturally pass. The clinic will be supplied with cases through the various channels indicated by the lines pointing to the upper quadrants of the circle. The majority of the cases will be sent from school by school doctors, school nurses, teachers, and attendance officers. Occasionally cases will be sent by parents, health visitors, family doctors, and hospitals.

The numerous channels through which the clinic cases may be distributed are also represented. At the upper quadrant of the circle the thick central arrow indicates that the majority of children who pass through the clinic return to school, while the two thin lateral arrows indicate that a certain number of cases not suitable for treatment in the clinic will be referred to hospitals or to family doctors. At the lower quadrant the channels to the different types of special school are shown, it being understood that the children sent to these schools will pass through the inspection clinic and be kept under special supervision while in these schools. Schools for the blind are held to include special classes for children suffering from high degrees of myopia or children otherwise "educationally blind" but who will earn their living as seeing adults; schools for the deaf are held to include special classes for the semi-deaf and semi-mute. Schools for children suffering from infectious skin diseases are limited to cases of ringworm and favus, the Edinburgh ringworm school being an example. The schools for cripples, open-air recovery schools, day open-air schools for tuberculous children, and residential sanatorium schools for tuberculous children, are grouped together and the possible lines of transference are indicated. For

* Annual Report of Medical Officer, Scotch Education Department, for Year ended 31st July 1913; published by permission of the Controller, H.M. Stationery Office.

tuberculous children it will no doubt be possible to associate the work of the clinic and special schools with the work of tuberculosis dispensaries that may be established within the district, in particular, to refer to the dispensary, cases of tuberculosis for confirmatory diagnosis or for special treatment.

At the left quadrant of the circle the three lines point to charitable agencies the services of which may possibly be available for necessitous children, while at the right quadrant the lines point to departments of the public health which may be utilised to supplement the work of the school clinic.

In our efforts to improve the health of the children the homes must not be forgotten. Every effort should be made to organise to the fullest extent the forces that can be brought to bear upon the general hygiene of the homes and the personal hygiene of the occupants. The chart indicates several of the more important channels through which the home may be influenced, more or less directly, by the operations of the school clinic—(1) through the school by means of the school child and by visits of the school nurse; (2) through the public health service by visits of the sanitary inspector and health visitor; (3) through charitable agencies by visits of the social worker; and (4) through tuberculosis schemes by visits of the officers employed for the purpose of home visitation.

A careful study of the chart thus shows the very important place which the school clinic holds as a means of correlating the work of the several agencies operating for the benefit of child life. It is doubtful whether any other agency at present exists which can do this so effectively as a well-organised school clinic. Further, such a clinic forms an admirable centre for co-ordinating the work of "following up," whether connected with inspection or with treatment, and a suitable centre for the registration and supervision of children who have been transferred for special reasons to agencies not directly under the control of the educational authority. While it is only in the more densely populated areas that a clinic of this type can be developed to a high degree of efficiency, its spirit and method should permeate medical inspection, supervision, and treatment in all districts.

The foregoing description represents a suitable organisation for dealing with defective children—the whole being controlled and directed by the school medical officer. But the medical officer should also be responsible for the correlation and control

of every factor in school life that has any bearing on the health and well-being of all school children so as to secure for each child the maximum chance of attaining to physiological fitness.

Broadly conceived, therefore, the organisation of school health administration involves—

1. Systematic and special medical inspections.
2. The provision of adequate facilities for efficient medical treatment and the correlation of inspection and treatment in all its forms—curative and preventive.
3. The medical supervision and after-care of children who have undergone medical treatment.
4. The modified educational treatment of exceptional children, whether in ordinary schools or in special schools, and the control and direction of special school programmes.
5. The systematic supervision and control of the hygiene of all day-schools.
6. The systematic supervision of physical education among all classes of children.
7. Supervision of schemes for the feeding and clothing of necessitous children.
8. Co-operation with Public Health authorities in the control of infectious diseases.
9. Co-ordination of the work of school health administration with child welfare agencies outside the scope of the School Boards.
10. The giving of advice with regard to school sites, school playgrounds, new buildings, or anything connected with the structure or internal arrangements of the school which might affect the health of the pupils.

The duties falling to the school medical officer are thus seen to be both numerous and important, but of no district can it be said that the organisation has reached the degree of complexity or comprehensiveness just outlined, although several of the larger schemes are rapidly approaching a high degree of efficiency.

V.—MOTHER WELFARE IN PREGNANCY AND INFANT HEALTH.

By J. W. BALLANTYNE, M.D., F.R.C.P.E.

"THE watchword of the medicine of the present day is *prevention*; but prevention, to be thoroughly effective, must be antenatal. The moment a child is born with a hereditary taint prevention has, so to say, its hands tied. It is no longer *prevention*; it is *palliation*." These words, which were written—in the preface to *Teratologia: a Quarterly Journal of Antenatal Pathology*—in October 1894, more than twenty-two years ago, will now meet with less danger of contradiction or at least of disregard than they did then. If I were rewriting them I should alter only two words, putting for "hereditary taint" the more accurate phrase "antenatal infection." In this form they may appropriately stand as the motto for all the modern preventive work which is termed Mother Welfare in Pregnancy in its relation to Infant Health, Antenatal Hygiene, Gestational Therapeutics, or Nurtural Eugenics.

In one sense this work has been awaiting accomplishment during all the ages in which the medical profession has faced disease and premature death; in another sense it is a twentieth-century novelty in the healing art which is calling for recognition, investigation, and application. Antenatal influence has been in the past the unknown quantity, so little suspected that to some it has been the imaginary quantity, which has set its mark upon health and disease after birth, mystifying the clinician, complicating his diagnosis, falsifying his prognosis, and disappointing his treatment. It was always present, sometimes acting benignly as a kind of physiological mascot handed down from a clean-living parent, at other times coming more prominently into action as a malign weapon of degeneration forged by a father or a mother without what may be termed a racial conscience. At all times it confused the issue, introducing an uncertainty into the course of events which more than anything else kept the teachable physician humble, and confounded the most confident expectations of the arrogant and proud practitioner. It was customary to require from an applicant for any post, whether it were the office stool or the professorial chair, his past record; but the family doctor took

over every new-born infant without it, asking for no parental præcognita or ancestral docquet. Babies were supposed to be of one brand and to be turned out of Nature's workshop according to a rigid and uniform specification. Consequently when an identical disease with an apparently similar degree of virulence smote down two infants both should have died in the same number of days or of hours; but one died and the other recovered under the same doctor, nurse, and treatment. The unknown or unrecognised factor was at work. The profession in the twentieth century is grasping the situation better; it is recognising that the new-born infant has a past and a complex one, that he is no sheet of paper white but an ancient palimpsest with confused and intermingled handwritings, and that he urgently requires differential management founded on the results of a scientifically guided retrospective interrogatory. The school medical officer hopes soon to receive from the general practitioner a health record for the first five years of life with each child of school age who comes under his care; and he trusts that these documents will enable him more effectively to preserve the health and prevent the sickness of the young folks under his official supervision. It should now be the desire of the obstetrician to provide each infant coming into the world with a similar record of the nine or ten months of his antenatal life founded upon the history of his mother's health before his birth and upon the state of his afterbirth. It would, of course, be of great value if the condition of his father's health were also available for the health docquet, and if the ill- or well-being of earlier progenitors could be filmed, so to speak, to complete the record; but it will be convenient to secure first the things which are within reach and to make a beginning with them, and surely it ought to be no impracticable task for the profession to supervise every expectant mother's health and examine every infant's umbilical cord and placenta. Why, even the testing of the maternal urine for albumen and of the fetal cord and placenta for the spirochaete pallida in every case would constitute an advance in diagnosis and in consequent treatment of antenatal and neonatal disorders of far-reaching importance.

The obstetrician has, of course, two purposes in his mind in connection with the *supervision of a pregnancy*; he seeks the expectant mother's welfare in the first place for her own sake, that she may have a healthy gestation and pass through labour uninjured and unweakened, and in the second place for her unborn infant's good that he may come into the world at the right time,

well nourished, and healthy. The former purpose was never lost sight of, although the profession was somewhat lukewarm in the carrying of it out, save in the cases in which the graver maladies of pregnancy showed themselves; the latter was strangely overlooked, and even now takes but a small place in the thoughts of the practitioner in charge of the expectant mother. Yet it is to the latter aspect of the subject that most attention is due when it is considered from the standpoint of Infant Welfare; it is upon the health of the mother in pregnancy in direct relation to the well-being of her child that the emphasis requires to be laid. The antenatal hygiene of the child is, as has been said, a comparatively new department of medicine, and it therefore calls for attention along two lines of approach. There must be, first, investigation of the facts and the building up of an adequate foundation of antenatal anatomy, physiology, pathology, and pharmacology; and then, second, there must be the application of the data thus learned to the management of the mother in her pregnancy and on behalf of her unborn infant. It will be well to fill in the programme of work under these two headings.

Scientific Investigation.—It is hardly an exaggeration to say that from the foetal side almost everything regarding pregnancy has yet to be scientifically investigated. Let us survey the field. There is first the *anatomy of the pregnant woman and her unborn child*. It may be admitted that one possesses a fair knowledge of the macroscopic anatomy of pregnancy, at any rate in the later months. Sectional methods have enabled the obstetrician to lay before the profession a scheme of the *topographical anatomy of the pregnant woman* which is adequate to its needs in this respect; and two Edinburgh observers, Berry Hart and Freeland Barbour, will always be honoured for their work in this sphere. It is largely to their labours that we owe our acquaintance with the changes in the disposition of the abdominal, pelvic, and thoracic organs which are imposed by the upward-growing and the expanding uterus; they also helped to map out for us the anatomy of the uterus in action in parturition. But can it for a moment be claimed that medicine possesses a full and sufficient knowledge of the histology of pregnancy? Is it not a common experience that when the pathologist attempts to unravel the causation of such a disease as eclampsia one of his greatest difficulties is to distinguish between the microscopical changes in the tissues which are really morbid and those which are the result of pregnancy itself? He is consequently coming up against the barrier of lack

of information, and so the amazing position is reached that many obstetricians are trying to find the histology of normal pregnancy in the organs of the women who die of eclampsia. In a word, is anyone bold enough to affirm that he is acquainted with the minute anatomy of the endocrinous organs of the expectant mother at the various months of her expectancy? As for the *anatomy of the foetus*, macroscopic and microscopic, is there anything approaching full knowledge? When I was doing the work on the sectional anatomy of the full-time and the premature foetus which was embodied in my M.D. thesis on the topographical anatomy of the unborn infant, I could hardly find a single prior observation to compare my results with, and I had literally to construct the scheme of, say, the levels of the organs in the neck, thorax, and abdomen from the specimens I was working with. There are still huge gaps in our knowledge of the anatomy of the foetus in the earlier months to be filled in; and I need only name the histology of the foetus to reveal the poverty in observations of that part of the subject. The anatomy and histology of the placenta have perhaps arrived nearer fulness of knowledge than the foetus of the early months, and yet there are unsettled questions regarding it too.

There is, second, the *physiology of pregnancy* both on the part of the *mother* and on that of her *unborn infant*. There is in this department of the subject enough research work to occupy not one physiologist but a whole school for a long time to come. It is when one comes to attempt a biological definition of the state of pregnancy that one discovers the barrenness of the field of investigation. Some fine pieces of work have indeed been done; but it is no depreciation of them to say that many more require to be done before one can try to settle the question whether gestation is an instance of parasitism, of semi-parasitism, of harmonious or disharmonious symbiosis, of physiological strain, of mild toxæmia, or what-not. And then, when one comes to the individual problems of the functions of the maternal organs in pregnancy, including those of the ductless glands and ovaries, of the placenta as a transmitting, sifting, detaining, digesting, secreting, or excreting organ, of the foetal membranes, of the liquor amnii, and of practically every organ and tissue in the body of the foetus and at every month in its antenatal life, one is simply lost in a thicket of problems belonging to that most complex and intricate interrelationship of mature and developing life which is termed pregnancy and antenatal existence. There would be not the slightest difficulty in naming twelve or twenty unsettled

questions in this sphere of physiology which all call for prolonged study and which would all yield information of vital interest. Why, even the chemical composition of the foetus and placenta and liquor amnii at the various months of gestation has not been adequately investigated or exactly ascertained.

In the third place, there is *embryology*. A vast amount of time and energy have been spent on its elucidation, and we are still far from the end. There yet remains the great task of setting the development of the human zygote and embryo free from the great mass of details relating to comparative embryogenesis with which it has been encumbered and in great part buried. There are probably as many and as striking differences between the development of animals as there are between their adult characters; and whilst an embryonic structure may bear the same name in two classes it may have quite a different mode of formation. Embryology as a science occupies a place apart, for it deals with a time in life when the distinction between anatomy and physiology is largely non-existent; in one sense an embryo's structure and its function run into one another, and its activity is occupied with its formation, whilst its parts are the result of its work. We see in the embryo the strange phenomenon of an organ such as the heart or liver in process of formation and differentiation and yet doing some at least of its functions all the time. No mention has been made of the huge hinterland of uninvestigated germinal or ovular life which lies beyond this only partly explored country of embryology. And yet, let us not forget it, the foundations of a rational management of the pregnant woman on behalf of her infant must rest upon the knowledge which is desiderated.

In the fourth place, much work waits to be done in the department of *antenatal pathology*. It is true that more observations have been made upon the *diseases of the pregnant woman* and of *her unborn infant* than upon the physiology of their healthy relationship; but much of the knowledge thus gained about the morbid has been deprived of its significance by the absence of insight into the normal. Further, there is hardly a disease of the mother or her foetus or a malformation of the embryo about which it can be said that we possess exhaustive information: eclampsia, hyperemesis, chorea, icterus, and many other gestational maladies all have a causation which is obscure, and there exist the most conflicting notions regarding the transmission of such diseases as syphilis and tuberculosis from the mother (not to name the father) to her child, and the teratogenic effects on the embryo of alcohol,

of lead, and of toxins have been only tentatively put forward. The pathology of the placenta and its bearing upon every other disorder of pregnancy is at best a partially-worked field of research; morbid states of the decidual and foetal membranes and of the liquor amnii have scarcely begun to be worked at.

Enough and more than enough has been said to prove the lack of information founded on exact research carried out by reliable methods; but a word must be added to point out that *antenatal pharmacology* is as backward a subject of investigation as any which has been named. Crowds of questions arise: In what way does pregnancy influence the action of drugs (*e.g.* quinine) on the maternal organs? in what form do medicines (*e.g.* salvarsan) given to the mother reach her child? has the placenta the power of passing some, of arresting others, of storing up others, and of chemically altering others? can remedies arrive at the foetus by the way of the liquor amnii? and is there a return current of medicinal substances from the foetus to the mother? Very incomplete answers can be given to any of these questions, and some riddles have not even yet been asked, far less read.

Obviously the only sure plan to correct these defects in our knowledge is simply to fill up all blanks by reliable observations. Research of all kinds is needed. A little (comparatively speaking) remains to be done in antenatal anatomy, more in histology, much in pathology, and a vast amount in physiology and pharmacology. The scientific investigator must put this subject forward as having a first claim upon his time, his resources, and his energy. There is work enough for many.

Practical Application.—The second avenue of approach to the securing of antenatal health is by the application of the knowledge which is at present in the possession of the profession to the management of the pregnant woman on behalf of her unborn child.

It may be objected that if information on the subject is so scanty, and really reliable scientific data so few, it is hopeless to proceed; but this is a wrong attitude entirely, and if it were taken up with respect to other conditions, such as cancer, whose cause is unknown, would disastrously arrest all progress in medicine. The obstetrician must do the best with what he has if he would win more, for, after all, there is the clinical side of the subject, and the empirical plan sometimes serves as a working basis.* Only one

* The benefits of prenatal supervision as set forth statistically have already been shown by Dr. M. M. Davis of Boston (*Boston Med. and Surg. Journ.*, 1917, vol. clxxvi. pp. 5-10); an abstract of this paper appeared in the *Edinburgh Medical Journal* for April 1917 (p. 299).

must be warily cautious; and whilst the general applicability of the rule that whatever is good or bad for the pregnant woman is good or bad for her infant *in utero* can be safely admitted, the exceptions to it must not be overlooked. It may turn out that they are not truly exceptions, but they must be borne in mind and very closely scrutinised when they are encountered. I refer, of course, to the apparent healthiness of the offspring of a markedly tuberculous mother and to the puny children occasionally given birth to by a woman who has put on both flesh and health in her pregnancy. With this *caveat* the whole system of mother welfare as commonly recommended nowadays may be with hopefulness adopted and set in action.

Perhaps the most pressing problem at the present time is the *linking up of the pregnant woman with the medical profession* and with the various institutions which are intended for her benefit and for that of the infant she is carrying in her womb, for it goes without saying that she may not consider herself ill enough to go to a doctor or nurse and yet be sufficiently far from health as to endanger her unborn child. An answer is, of course, forthcoming in the imposition by law of compulsory *notification or registration of pregnancy*. This has been seriously proposed, and has been asked for even during the progress of the war. I have elsewhere (*Brit. Med. Journ.*, i. 1916, 594) tabulated what I regard as the advantages and disadvantages of such a legislative act, and it has seemed to me that it would be injudicious to attempt to secure the supervision of the expectant mothers in the population by this means. I would rely upon the dissemination by medical men and women and by nurses of information respecting the advantages to the mothers themselves as well as to their expected offspring of their being under professional observation and care during the whole period of pregnancy; and I would advocate the establishment of Maternity Centres at which the poorest woman should be able to receive attention and supervision. The direction in which the law might usefully show activity would be in the provision of financial or other aid to enable needy women to keep in good health. Why maternity benefit should be administered after the event has always been a puzzle to me as difficult to solve as why a doctor should lavish daily visits in the puerperium and hardly appear in the pregnancy of his patient. It looks to me rather like giving a soldier his pay and his food and his training *after* he has been through his baptism of fire! To sum up, let every expectant mother report herself to her doctor or nurse or to a

maternity centre, and let such reporting constitute *voluntary notification* and be accepted as such and rewarded by medical care and in necessitous cases by State aid before the birth of the child as well as after it.

In the next place, there must be an *administrative machinery* and a supply of institutions and workers by means of which and of whom the expectant mother can easily get information, supervision, and if need be treatment during her pregnancy and confinement. It will be convenient to begin at the periphery, so to speak, and work towards the centre in describing the necessary equipment of a *well-appointed civic mother welfare system*. There are first the *Maternity Centres or Antenatal Clinics*. These should be placed in the districts where expectant mothers reside who are of the class in life in which lack of means forbids the engagement of a doctor who shall supervise the pregnancy and labour personally; they need be of a quite inexpensive character—three small rooms on a ground floor simply furnished will suffice; but they must be officered by a qualified obstetrician and by a nurse who possesses the diploma of the C.M.B. Once or twice a week the rooms should be open and the staff in attendance. It should be the aim of every such centre to get into touch, through health visitors or others, with every expectant mother in the district who has no regular medical attendant, early in the time of her expectancy, and quite irrespective of the existence of distressing symptoms or discomfort. It is a clinic for all pregnant women, not only for sick ones; indeed, in many instances it will have served its purpose when it has imparted information and ascertained that a normal pregnancy is pursuing its way normally. Its motto should be the supervision of the normal and the immediate detection and transference of the abnormal cases to the proper institutions for their management. In every case a complete record should be made and kept for reference; a physical examination of the mammary glands, abdomen, and pelvis should be carried through; an analysis of the urine for albumen, sugar, and acetone, and possibly an estimation of the urea, should be made; and the state of the heart, lungs, digestive, nervous, and other systems should be investigated. Such details as the state of the teeth, the weight of the woman, and the existence of even the least marked deviations from a general condition of well-being, should on no account be overlooked or thought lightly of. Such centres are listening posts, and the observers must have open ears and be keenly attentive. The mother should not only be instructed regarding baby clothes and

other preparations for the coming confinement, she should be shown the things; the certified midwife or nurse should visit her home and see that everything is in order there; the date of the confinement should be fixed as correctly as possible; and the woman ought to be supplied with some small book or pamphlet written in plain language and conveying necessary information of an irreproachable kind. It need hardly be added that these centres should never allow themselves to become touts for special brands of infant foods or emporia for patent belts, proprietary medicines, or the like. The doctor or nurse (a certified midwife) may, of course, attend confinements if these are expected to be normal and if they remain so; but it is not one of their duties to manage difficult or complicated midwiferies. As a general rule the emergence of an abnormality at any time is the signal for transference of the patient elsewhere.

Next in order come the *dispensaries*. These institutions may have antenatal clinics or listening posts of their own; but it will be for the advantage of the mother welfare system if they will refrain from the purely preventive part of the work, leaving it to the maternity centres. To them should come the expectant mothers who have been found suffering from one or other of the minor ailments of pregnancy, who require something more than the very simplest treatment, and who need more intimate and continuous attendance. Every dispensary ought to have at least one weekly clinic for expectant mothers, and it should give its first and chief attention to the patients sent on to it from the Maternity Centres. Some of these cases may require more than it can supply, and it ought to send such cases on to hospitals. At each dispensary there should be a specialist in obstetrics well qualified to deal with the diseases of pregnancy and capable of detecting and estimating possible risks in the forthcoming confinement. The dispensary is or ought to be the half-way house between the Maternity Centre with its purely preventive work and the Maternity Hospital with its mainly curative and operative procedures. In a small town or rural district the dispensary may be omitted from the system altogether.

The *Maternity Hospital* or the *Maternity Block in a General Hospital* is, of necessity, the most specialised part of the whole system. Time need not be spent on a description of its staff and equipment for the actual management of the women in labour and in the puerperal state; it is taken for granted that they are adequate, both as respects the indoor and outdoor departments.

It is necessary, however, to emphasise the impossibility of a maternity hospital doing without a *pre-maternity department*, and it is wise to add a few words regarding the component parts of the same. There should be an antenatal clinic once, twice, thrice a week, or, best of all, every day. The patients coming to this clinic will be mainly those mothers who have been found at the Maternity Centres or dispensaries to be suffering from one or other of the abnormalities of pregnancy, or who may be expected to have difficulty at the time of confinement, or whose past experiences (maternal and infantile) have been unfortunate (dead-born infants, premature labours, etc.). One of the senior physicians of the hospital and one who is a specialist in this department of obstetrics should be in charge of the antenatal clinic, and he should have an assistant and a trained sister with a nurse to aid him in testing urines, preparing the patients, and keeping the records. Every patient should be examined in detail, and thoroughly; the information which she brings with her from centre or dispensary should be noted and entered in the books; and her future course of procedure should be clearly explained to her. In some instances it will be sufficient to ask her to return at intervals; in others medicinal or other treatment such as can be given to her without residence in the hospital will be called for; and in yet others it will be necessary to take her into the pre-maternity ward at once for more active management or for operation. In a very few cases she may be found to be actually having pains and may be sent at once to the labour ward.

Thus the expectant mother has been traced from the periphery to the centre of the mother welfare system, and after delivery she will of course return whence she came, carrying, if all has gone well, her child at her breast. She may not on her inward journey require to go further than the antenatal clinic in her own district; in other cases she will need to pass to the dispensary; and in a small number of instances she will reach the pre-maternity ward in the Maternity Hospital. The main matter is that there shall be all these provisions made for her up to the extreme possibility of her needs.

It will, of course, be borne in mind that the maternity hospital must be prepared to deal with cases coming to it from its own outdoor department, and it will be necessary for it to have on its staff women who have had a medical and surgical as well as an obstetric training. These women, whom the Americans have termed "*prenatal nurses*," will get into touch with expectant

mothers in the outdoor department and will be put in charge of the pre-maternity ward or wards in the indoor part of the hospital; they are an essential part of the pre-maternity system.

Every maternity hospital should be provided with a skilled *pathologist* capable not only of conducting post-mortem examinations upon women dying in labour, but familiar also with the appearances of foetuses, abortion sacs, placentas, and the like, and in possession of the most up-to-date knowledge of the pathology of pregnancy. If possible there should be a *pathological department* attached to the hospital with young graduates (Carnegie scholars and others) working in it at the problems of antenatal anatomy, physiology, and pathology under the pathologist to the institution. The foetal annexa (placenta, membranes, cord, and liquor amnii) from every case of labour should pass through this department and a record be kept of the results of their examination; all dead-born foetuses should be investigated here and the cause of death ascertained and registered; and research work on special subjects should be encouraged. Particular attention should be given to every case of premature labour, and an attempt made to gain sufficient data for the painting, so to say, of a filled-in picture of the anatomy, physiology, and pathology of the seven- or eight-months' foetus and placenta.

In regard to most of the essential parts of the administrative machinery above described, Edinburgh is already well furnished, and the parts which are lacking could be comparatively easily supplied. What is really needed is a fitting of the various parts together so that all shall work as one with smoothness and efficiency, and it would seem that this end may be most easily attained under a civic scheme with the medical officer of health and an advisory committee of four or five specialists interested therein.

There are, however, other practical applications which the subject of mother welfare suggests. There is, for instance, the need for definite and sufficient *instruction in antenatal pathology and hygiene* in the teaching of obstetrics, or if that department be too overloaded, in special short courses of lectures and practical work. If the matter is to be dealt with by the Professor of Midwifery, then it will be well that it be also included in the scope of the examinations and noted in the programme of the work of the class. To some extent this has already been done in Edinburgh, both in the general teaching of obstetrics and in the form of special courses of lectures (some sixteen years ago); but it requires

a more definite recognition and adoption. Then, again, there is need for a great advance in the *methods of death certification* in respect to infants dying before, at, and immediately after birth. The vague generalities, such as "prematurity of birth," which are permitted in the notification of dead births and in the registration of neonatal deaths, would not be tolerated for a moment if the subject were a child or an adult. The nomenclature of the subject, too, if not erroneous is antiquated: terms such as "putrid," "macerated," and the like are relics of an inexact past, and the word "stillbirth" has been forced into a significance which it ought never to have possessed. The putting of all this right must, however, be postponed until the scientific investigation of the subject set forth in detail in the earlier part of this article shall have been accomplished or at least seriously embarked upon. Recent legislative measures have, however, been taken in the right direction, and before long it will be possible to know how many infants perish annually in this country in the last two months of antenatal existence and in the act of birth, and there will be an increasing likelihood that the alleged cause of neonatal death is the real one. In connection with neonatal life and death it may be permissible here to add, although perhaps the matter is not, strictly speaking, within the scope of the part of the subject which has been put into my hands, that almost as much requires to be done for the proper understanding of the physiology and pathology and hygiene of the first four weeks after birth as for any period of equal length before that event. These four weeks see a most remarkable readjustment of function in the new-born infant, the antenatal economy giving way to, and being replaced by, the postnatal one; and the pathology of the time has a special group of characters which no observer, be he clinician or pathologist, can afford to lose sight of. In a word, the physiology and pathology of antenatal life project themselves into and modify the normal and abnormal conditions which follow after birth; and to find out the exact way in which they so act is one of the pressing problems for those who are specially studying neonatal life and treating new-born infants.

In this paper I have dealt rather with broad principles than with details; but it must not be forgotten that there exist details which may require some consideration before they can be satisfactorily adjusted. In a recent article (*Internat. Clinics*, 1916, s. 26, vol. iv, pp. 93-106), entitled "Where Obstetrics and Paediatrics Meet: Infant Welfare," I have referred to the No-Man's Land or debatable territory lying between the two subjects, viz. the

nursing period of some nine months following birth. During this time the mother still constitutes for her child what one may call its nutritional environment, and by watching over her health one can control to a considerable extent the food supplied to the infant at the breast. Now the question arises: Is the suckling to be kept under obstetric care or is he to be placed in charge of the paediatrist? Is the line of demarcation between the two parts of infant welfare work to be drawn at weaning or at birth? Arguments in favour of separation of the two schemes at birth chiefly emphasise the advantages to administration which must follow, whilst a divergence of the paths at weaning seems medically more logical. Perhaps a suitable date may be found at the end of the first postnatal month; this marks the close of the puerperium in the mother and of neonatal life in her child. There are other questions of the same kind which call for discussion, but in all probability a year's experience of any scheme in actual practice will suffice to settle most of them. We must stand not upon the order of our working so much as get to work at once.

ADDENDUM: PREVIOUS LECTURES AND ARTICLES BY THE AUTHOR
ON THE WELFARE OF THE CHILD THROUGH THE MOTHER.

¹ "A Plea for a Pre-Maternity Hospital," *Brit. Med. Journ.*, 1901, vol. i. p. 813; ² "Abortions," *Internat. Clinics*, 1901, 11 s., vol. ii. p. 231; ³ "A Visit to the Wards of the Pre-Maternity Hospital," *Amer. Journ. Obstet.*, 1901, vol. xliii. p. 593 (a translation by L. Kleinwächter appeared in *Der Frauenarzt*, 20th September 1901, p. 426, under the title, "Ein Besuch in den Sälen des Pre-Maternité-Hospitales"); ⁴ "Hospital Accommodation for the Pregnant Woman," *Brit. Med. Journ.*, 1901, vol. ii. p. 1192; ⁵ "Maternities and Pre-Maternities," *Brit. Med. Journ.*, 1902, vol. i. p. 65; ⁶ *Manual of Antenatal Pathology and Hygiene*, 1902, vol. i. p. 466; ⁷ "Hospital Treatment of Morbid Pregnancies," *Brit. Med. Journ.*, 1908, vol. i. p. 65; ⁸ "Pre-Maternity Hospital Practice," *Journ. Obstet. and Gynæc. Brit. Empire*, 1909, vol. xv. pp. 93, 169; ⁹ "Morbid Pregnancies under Hospital Treatment," *Internat. Clinics*, 1911, 21 s., vol. iii. p. 211; ¹⁰ "Demonstrations of Diseases of Pregnancy," *Brit. Med. Journ.*, 1913, vol. ii. p. 434; ¹¹ "Extension of the Pre-Maternity System," *Brit. Med. Journ.*, 1913, vol. ii. p. 825; ¹² "Health Before Birth," *Internat. Clinics*, 1914, 24 s., vol. ii. p. 1; ¹³ "Alcoholism and Antenatal Hygiene," *Brit. Journ. Inebriety*, 1915, vol. xiii. p. 87; ¹⁴ "Antenatal Clinics and Pre-Maternity Practice at the Edinburgh Royal Maternity Hospital," *Brit. Med. Journ.*, 1916, vol. i. pp. 189, 234, 275; ¹⁵ "Pre-Maternity Nurses and Nursing," *Journ. State Medicine*, 1916, vol. xxiv. p. 114; ¹⁶ "Care of the Mother before the Birth of her Child," *Trans. Incorp. San. Assoc. of Scotland*, 42nd Annual Congress, Edinburgh, 1916, pp. 33-45; ¹⁷ "Where Obstetrics and Pædiatrics Meet: Infant Welfare," *Internat. Clinics*, 1916, 26 s., vol. iv. p. 93; ¹⁸ "Alcohol and Antenatal Child Welfare," *Brit. Journ. Inebriety*, 1917, vol. xiv. pp. 93-116.

VI.—PÆDIATRICS AND CHILD WELFARE.

By A. DINGWALL FORDYCE, M.D.

DURING the five years 1910-1914 inclusive 22,663 children attended the medical Out-patient Department of the Royal Hospital for Sick Children, and of these 12,869 were under 4 years of age. The majority, then, were babies, and of these in most cases the determining or most important contributory cause of their presence at hospital was gross breach of the laws of child welfare. Of patients admitted to the wards during the same period 432 were those of babies under 1 year of age suffering from "marasmus" or "gastro-enteritis," and of these 162 died and 25 are noted as "left hospital *in statu quo*," so that in 43 per cent. of these cases hospital treatment was of no avail.

Improper baby-feeding is notoriously common, and its direful effects are not only often direct and immediate, but it is a frequent underlying cause of the weakness in many children which renders them ready victims to a great variety of ills. It is a condition of affairs which can only be remedied by the diffusion of knowledge of the laws of health among the community, and by the increase or granting of facilities whereby the mother may have the chance of acting up to her knowledge. Further, the statistics quoted of children under 1 year of age suffering from "marasmus" and "gastro-enteritis" show—which is the universal experience—that such forms of ailment, when the cases are numerous, are unsuited for admission to the wards of a general hospital for sick children.

To meet the requirement it is necessary to have a Babies' Hospital, with provision for the accommodation of nursing mothers (and, if possible, a regular supply of mothers' milk), amply staffed by nursemaids, and having connected with it a milk laboratory and full laboratory facilities.

Closely connected with the subject of improper diet in infancy is that of the development of rickets. Rickets, while less prevalent and less severe than in past years in this part of the country, is still a very common disease. Although many of the children attending the Out-patient Department of the Sick Children's Hospital suffer from rickets, the statistics of patients admitted to the wards show that during the five years 1910-1914 only 182 children were admitted for "rickets." Of these 3 died.

Rickets, then, is usually a mild condition, and one which does not directly endanger life. But associated with the condition it is common to find much nervous instability. This instability manifests itself in three chief guises, namely, laryngismus stridulus, tetany, and convulsions. The first-named condition is one which we prefer to treat at home rather than in the ward of a hospital, and in the hospital statistics for the years already mentioned no note of a case admitted is to be found. During these same years, however, 62 children suffering from "convulsions" were admitted, and 9 (all under 1 year of age) died, while 12 cases of "tetany" were admitted and 3 died (all under 1 year of age). There is, then, a definite risk of death from rickets, more particularly when it is associated with marked nervous symptoms.

But the serious nature of rickets is only appreciated if we consider its general debilitating effects, and the condition of increased susceptibility of infection which it engenders. The dangers of bronchitis and of pneumonia in a rickety baby are enormously increased, the acute infective fevers are a much more deadly menace, and tuberculous infection is facilitated. Rickets is a preventable disease; we want to exterminate it. Regular breast nursing and, later, good regular feeding, with plenty of fresh air, are the most certain preventives.

We want, then, to encourage breast nursing for the natural period of eight months, to provide a suitable milk supply for young children and supervise its distribution and administration, and to see to it that even in the lowest slums some opportunity is granted the baby of a place in the sun.

From earliest infancy onwards the mouth with its adnexa is a prolific source of trouble. The natural processes of oral digestion, respiration, and dentition are all closely connected with abnormal symptoms which, if unchecked or untreated, may lead sooner or later to grave disorder. How many children do we see with healthy mouth, healthy teeth, healthy throat, no nasal discharge, and no "running ear"? Not many. Every such physical fault is a site of serious danger. The child with a "dirty" mouth and throat is the child asking for infection and trouble of every kind. He is the child who suffers from indigestion, debility, running ear, enlarged glands, and is a favourable subject for infection by any of the many micro-organisms which are thought to gain access to the tissues through the throat. He is the child who has severe throat complications when he suffers from any of the acute infective fevers. Dental caries is prevalent to a remarkable extent. A child irregularly fed on a patent food and pap during infancy is

likely to cut poor, fragile teeth, prone to decay. The young child improperly fed, and who suffers from frequent eructations and vomiting, is prone to irritability of the throat and nose, and has increased liability to suffer from adenoid growths and enlarged tonsils. Tuberculous otitis media in babies under 6 months of age always occurs in cases of bottle-fed babies, and is almost certainly due to aspiration of infected milk up the Eustachian tube.

All such dangers could be largely prevented by wise provision for the supervision of young children. Prevention is a comparatively simple matter; the dangers of the conditions are great. We do not fully understand the manner of infection in such dread diseases as infantile paralysis and cerebro-spinal meningitis, but we have grounds for believing that infection occurs through the throat, and unhealthy mouth and throat conditions cannot aid resistance. A "running ear" *may* be nothing more than a bother, but such a chronic purulent otitis media is a common origin of fatal purulent meningitis. Further, once acquired, such chronic ear, mouth, and throat conditions are hard to deal with in an unsatisfactory environment. These children often require prolonged care in a country convalescent home. This is also the case with children suffering from chronic digestive disorder and most cases of functional nervous disorder. Accommodation for convalescent children requires to be greatly extended. Convalescence from many kinds of illness cannot be satisfactory in the poorer parts of a large city. This is very marked in many cases after an acute infective fever. Convalescence is retarded and unsatisfactory, sequelæ develop, and the downward path of the child is such that he is in imminent danger of permanent incapacity or death.

In a table of statistics drawn up by the Medical Officer of Health for Edinburgh there is shown the deaths of children under 5 years of age during the years 1911-1915 inclusive. The number of these deaths totals 5578. The highest single total among them (756) is that for pneumonia (all forms); the next highest, premature birth (677). Then come whooping-cough (489) and measles (451); these two diseases accounting for 940 deaths. Even from such figures the devastating effect of whooping-cough and measles among poor children under 5 years of age is evident. But the high mortality rate among young children is largely due to the great danger of these diseases when they infect weakly, ailing children, and many of the victims, under effective preventive measures, should not have been weakly or ailing prior to infection.

Further, these figures only disclose a minute part of the devastation caused by whooping-cough and measles. The per-

centage mortality directly caused by these diseases themselves is small. The extent of the mischief they work in the community is difficult to estimate; it is, however, certainly very great. Measles and whooping-cough produce a lowered vitality throughout the respiratory system; they are almost invariably accompanied by some degree of respiratory trouble, and they produce a marked tendency to prolonged respiratory catarrh. Bronchitis and pneumonia are very common sequelæ among poor children, and as post-measles or post-pertussis diseases are of markedly worse prognosis than when occurring independently. It is, further, a notable fact that in a very large proportion of cases of tuberculosis among poor children the onset of symptoms can be traced to one or other of these fevers, and there can be no doubt whatever that plentiful convalescent accommodation for children recovering from them would reduce to a marked extent the amount of tuberculous disease. Edinburgh is famous for her Tuberculosis Scheme—a scheme for the treatment and, if possible, the cure of the tuberculous sick, and for the prevention of infection from individual to individual. But all child welfare work is an anti-tuberculosis crusade; it is based on prophylaxis, and its base is a tripod—healthy children, safe milk, avoidance of infected adults.

The amount of bone and glandular tuberculosis in our midst is appalling. No statistics can give any idea of its extent. But we know that the immensely greater part of it is due to milk infection, and is bovine in origin. We know the cause; we shall prevent the incidence when we secure a safe milk supply.

Intractable pulmonary tuberculosis is much less prevalent. It is wise to say intractable, because so often it is quite impossible to be certain whether a given condition has been tuberculous in nature or not. But we are constantly meeting with prolonged lung affections, which ultimately clear up entirely, so far as every known method of investigation can determine, and in many of these cases neither from the clinical symptoms nor from any available test is there any clear reason for ascribing to the tubercle bacillus the *role* of infecting agent. In all such cases a suitable environment—a healthy convalescent home—is a factor of the greatest value.

The Reports of the Royal Hospital for Sick Children for the five years already quoted, namely, 1910-1914 inclusive, show that there were treated as in-patients 68 children suffering from "rheumatism," 147 from "chorea," and 80 from "endocarditis." Of these 8 died—1 case of chorea and 7 of endocarditis. What of the other 288 children—all or almost

all rheumatic? A large proportion of them must have left hospital with a damaged heart, still more must have gone with a temporarily weakened heart, and all were threatened with grave cardiac disease. Rheumatism is very rare in children under 2 years of age. It is, however, common thereafter, and the younger the patient when definite symptoms of rheumatism appear the worse is the prognosis, because the greater is the liability to heart affection. Like so many other conditions, if it were only possible to delay infection—when avoidance is impossible—until the child were older, he would stand a much better chance of complete recovery. All child welfare schemes seek to prevent or delay the onset of disease, and in this particular instance it is most important that no rheumatic manifestation—however apparently trivial—in a young child should be neglected, and his heart should be kept under constant observation. Should active rheumatism develop, rest in bed for weeks, and in some cases for months, is essential if the child is thereafter to have a chance of leading an average normal life and is not to be a chronic invalid suffering from “heart disease.” Prolonged treatment in a convalescent home is here again often the only possible chance for the child.

The position of mentally defective children is such that special attention has already been widely devoted to them. Though the position of congenital syphilis in the etiology of mental defect is, to a large extent, still indeterminate, other evil effects of the disease among children are striking and widespread. One of the most important steps in the furthering of child welfare will come when the whole subject of venereal disease is dealt with in a frank and drastic manner.

There is a further subject which equally demands immediate attention. It is that of the illegitimate child, and more particularly the case of the unmarried mother and her first illegitimate child. The position of these individuals at present is nothing short of a scandal. True, some provision for the care of these girls before the birth of their child has for several years been made in Edinburgh, and more recently a small but invaluable Home has been opened for the care of the mothers and children. Many of these girls find themselves in a hopelessly difficult position on leaving the Maternity Hospital at the expiry of ten days. Some have no home, and others are forbidden by their relations to return with their babies to the home they have disgraced. The only course open to them is to board out their young babies with the first person who offers, and to seek work, however unfit physically

they may be. The development of several small antenatal and postnatal homes for these cases, and their inclusion in a wide civic scheme, is most desirable and necessary.

Finally, recognising that the cause of pædiatrics is but one special branch of the cause of child welfare, I epitomise suggestions for the cause as a whole, as follows:—

CARE OF SICK CHILDREN.

- I. More thorough, systematic training of medical students.
 - (a) Centralisation of education control in one hand.
 - (b) The institution of a fully-equipped babies' hospital.
- II. Greater facilities for efficient treatment.
 - (a) The institution of a fully-equipped babies' hospital (as mentioned above, I. (b)).
 - (b) Special dispensary clinics throughout the city and the provision of safe milk.
 - (c) Greatly extended convalescent home accommodation.

PREVENTIVE WORK AMONG CHILDREN.

- I. Diffusion of knowledge of the laws of health among parents, and facilities for trained advice and help at home.
 - (a) The employment of thoroughly-trained health visitors, and such correlation of the work of various agencies as will render it possible for the number of visitors to the home to be considerably diminished.
 - (b) The development of schools for mothers.
- II. Greater facilities for retaining health.
 - (a) Improved housing and lighting.
 - (b) Further development of open spaces, play centres, kindergartens, and day nurseries.
 - (c) The provision of a pure milk supply for young children.
 - (d) The institution of several small homes for unmarried mothers and their first illegitimate child; more stringent supervision of boarded-out children.
- III. The further development of child welfare centres throughout the city, and consequently the extension of medical superintendence from periods of disease and convalescence to times of health.

To ensure success in the work of child welfare, the closest co-operation of the various agencies is essential. The need of such work on a broad basis is now widely and fully realised; it remains to do it in what manner we can.

VII.—SOME PRACTICAL POINTS REGARDING CHILD WELFARE ORGANISATION.

By JOHN THOMSON, M.D.

IN drawing up a scheme of child welfare we have in view the health and happiness of the individual children and their mothers, the lessening of the still unnecessarily high infantile death-rate, and other public health considerations. To attain these objects we must try to improve the capacity of those who can best further them, by arranging for the special teaching and training of the mothers, and also of health visitors and medical students; and we must also see to it that scientific research is not only allowed but encouraged as much as possible. In any plan of child welfare the mothers must, of course, bulk very largely. We cannot, even if we would, separate their interests from those of their children, for the most efficient help that can be afforded to the children is usually that which is given through the mothers, and the best and easiest way to win the mothers is to earn their gratitude by being good to the children. While the children with whom such a scheme as we are considering is chiefly concerned are those under school age, it is not desirable to draw too hard and fast a line between them and those a little older.

In this paper it is not proposed to treat the subject of child welfare systematically, but merely to discuss a few points which seem, in the light of many years of children's hospital and dispensary work, to be of practical importance. There are, of course, many other aspects of the subject which will require careful consideration, such as those dealing with finance and with the relation of the scheme to the health measures of the National Insurance Act and those of the School Board, also the correlation of the Health Visiting and that of other institutions, but these cannot be discussed here.

The points to be dealt with here are—I. The Classification and Organisation of Child Welfare Agencies; II. The Extreme Importance of Home Visitation in connection with all Out-patient Work; III. The Staffing of Child Welfare Organisations; and IV. Some Child Welfare Institutions which urgently require to be organised and developed in Edinburgh.

SCHEME OF CLASSIFICATION OF CHILD WELFARE AGENCIES IN
EDINBURGH.*

	CLASS I. PREVENTION.	CLASS II. OUT-PATIENT TREATMENT.	CLASS III. IN-PATIENT TREAT- MENT.
	Health Centres and Visitation and School Inspection.	Dispensaries and Visitation.	Hospitals (General and Special), Convalescent Homes, Open-air Schools.
MOTHERS.	Maternity Centres (at Maternity Hospital, Hospice, and other places). Visitation.	Maternity Hospital Out-patient Department. Hospice. Dispensaries. Visitation.	Maternity Hospital. Hospice. Royal Infirmary and other Hospitals.
BABIES.	Infant Health Centres. Health Visitors.	Children's Hospital Out-patient Department. Dispensaries. Visitation by medical officers, Queen's nurses, and other nurses.	Children's Hospital (proposed Infants' Hospital). Other Hospitals.
CHILDREN UNDER 5 YEARS.	Day Nurseries and Nursery Schools. Kindergartens and Play Centres. Health Visitors.	As above.	Children's Hospital and other Hospitals. Cripples' Homes, etc. Convalescent Homes.
SCHOOL CHILDREN.	Medical Inspection of Schools. Play Centres. Country Holiday Schemes.	School Cliniques. Children's Hospital Out-patient Department. Royal Infirmary and other Out-patient Departments. Dispensaries (General and Special). Special Schools and Classes. Visitation.	As above. Also Open-air Residential Schools (Humbie). Asylums for Blind, Deaf, and Imbecile Children.

* The agencies in Classes II. and III. are, of course, intended only for those children who have not got a family doctor, except in cases where the doctor has sent them to the hospital or dispensary for diagnosis or treatment.

I. *Classification of Child Welfare Agencies.*—The organisations for dealing with the children of the poorest classes and their mothers are numerous and of many different kinds; but they fall readily and naturally into three distinct classes. For many reasons it is important to keep this classification in mind, and to realise the proper functions of the different agencies.

The classes are as follows:—

Class (i.) *Preventive Agencies.*—Health Centres and Visitation, School Inspection, and Holiday Schemes.

Class (ii.) *Dispensaries.* — For Out-patient Treatment and Visitation.

Class (iii.) *Resident Institutions.*—Hospitals (general and special) Convalescent Homes, and Open-air Schools.

The functions of these three classes are quite distinct, and may be defined as follows:—

Class (i.) *Preventive Agencies.*—The work they do is most important, and it is such as cannot be carried out properly either by dispensaries or hospitals. They are not intended to treat, but to prevent, disease. Their duties are three in number:—

- (a) To instruct, train, and assist the mothers to keep their children healthy.
- (b) In the case of illness to make the simple diagnosis that the child is ill and needs medical care.
- (c) To arrange that the child is sent, without delay, to where his illness can be diagnosed and treated.

Class (ii.) *Dispensaries.*—For the out-patient treatment and visitation of sick children. Their functions are—

- (a) To diagnose the nature of the disease present.
- (b) To arrange, if the case is suitable, for out-patient attendance and visitation.
- (c) If the case is not suitable for out-patient treatment, to send the child to an appropriate institution — children's hospital, fever hospital, cripples' home, special institution, convalescent home, etc., or to a special dispensary, such as those for the eye, ear, throat, or teeth.

Class (iii.) *Resident Institutions.*—Their business is—

- (a) To give in-patient treatment.
- (b) When this is finished, to send the child back to home and school life if he is quite well; and, if not, to transfer him to a convalescent home or, in special cases, to some other suitable institution.

II. *The Importance of Home Visitation.*—The extreme import-

ance of a certain amount of home-visiting in connection with all health centres and dispensaries can scarcely be too strongly emphasised. The absence of such visitation interferes greatly with the efficiency of most of our non-resident institutions for looking after children. When an inexperienced mother tries to carry out at home the advice she has been given at the dispensary, she very often finds that she has forgotten, or imperfectly understood, the directions she received; or she meets with some difficulty in carrying them out which she had not anticipated and does not know how to overcome. Under such circumstances, if she is left to herself, the advice remains unacted on. A few calls from a competent visitor, however, will at once dispel her difficulties and give her the encouragement she needs, so that the proper treatment is intelligently carried out and persevered in. At the same time, if the visitor knows her business, she can often give the mother further suggestions as to the management of the child and the home; and make useful investigations as to the household conditions and as to whether it is possible to have the treatment successfully carried out at home. With such visitation, a child can often be thoroughly well looked after at home, when without it, admission to hospital would have been necessary. Visitation will also, at times, prevent a child's being kept too long at home when early hospital treatment is really necessary for his recovery.

III. *On the Staff required.*—It is, of course, necessary that the medical staffs of the Maternity and those of the Children's Departments should be different—especially in the case of dispensaries. The reasons for this need not be discussed here, but the fact will not be disputed by anyone who has had practical experience of the working of such institutions.

The staff of the Health Centres and the Health Visitors should work in close collaboration; and they should all be under the regular supervision and control of a medical man or woman. It may be suggested, however, that the supervision of a Health Centre does not necessarily demand the same amount of clinical experience as is needed for the work of a hospital or dispensary. If the preventive agencies that deal with babies are to be carried on apart from the hospitals and dispensaries, it seems more than doubtful whether a sufficient number of experienced physicians are likely to be found able and willing to give the necessary time to such work alone. Probably the ideal plan would be, in some cases at least, to have a Dispensary for Sick Children accommodated

in a room adjoining the Health Centre and meeting about the same time. If this were arranged, the physician could easily supervise the Health Centre as well as running the dispensary. He would also be responsible for the teaching of medical students and for the organisation and superintendence of the other teaching work of the Centre. There should be no difficulty in filling such posts satisfactorily, for they would afford valuable clinical experience and give splendid opportunities for original work—quite as good as those at any hospital.

It is a much-debated question whether the Infant Health Visiting should be undertaken only, as some hold, by fully trained, experienced, and paid whole-time visitors; or if, as others think, a large part of it should be left in the hands of voluntary workers. The matter must be decided by the results of the experience of those in charge of such work. A few remarks, of a general nature, may perhaps be allowed to an outsider.

It seems obvious that the kind of visiting required in the purely preventive work of health-visiting does not call for any special technical experience of sick-nursing. It can be perfectly well done by sensible married women or others who have sympathy, insight, and common sense, along with a practical knowledge of modern ideas of infant feeding and hygiene, and of the household economy of a poor man's home. It is, however, I think, undeniable that the larger the number of visitors with a special expert training in their duties that can be employed, the better will the visiting be done; and it is certainly necessary that those who superintend the practical side of the work should be specially trained and give all their time to their duties. It is very doubtful whether any young unmarried ladies should be eligible for the post of Health Visitor; and certainly only such unpaid workers should be enrolled as will undertake to act entirely under direction. Before beginning their work the visitors should have a good training and pass a thoroughly practical examination to show that they are familiar with the duties required of them.

One of the great difficulties inherent in any scheme of household visitation is how to avoid harassing the mothers by a useless multiplication of visitors. If all the Health Visitors are competent and experienced women this will obviously make it more possible to entrust to them other duties besides those connected with the babies, and thus obviate the necessity of sending visitors on other errands to the household.

The visiting of sick children should, of course, be undertaken

only by those who are trained nurses. The relation to the Victoria Nurses of those nurses who work under the scheme will need to be clearly defined.

IV. *On some greatly needed Extensions of "Work."*—There are various directions in which increased opportunities are urgently called for in this city and would be most beneficial.

(a) *Children's Dispensaries.*—It would be a very great boon to the sick children of Edinburgh and to their mothers if the Out-patient Department of the Children's Hospital could be supplemented by a few branch dispensaries in those poor and populous districts which are far from the hospital. At present there is only one such children's clinique, which is held twice a week in the New Town Dispensary. Others, in such crowded districts as Gorgie, St. Leonard's, and Abbeyhill, would be extremely useful.

When a central out-patient department like that at the Children's Hospital grows beyond a certain size, the large number of the children attending, and the long distance they have to be brought, interfere seriously with the value of the treatment, so that, in not a few instances, more harm than good is done by the child's attendance at the hospital. It is a hardship for the mother and a danger to the sick child when the latter has to be brought a long way to the clinique in bad weather, and to be kept waiting a large part of the morning before advice and medicine are obtained. The unmanageable number of the cases, many of them very trivial, that come to the Children's Hospital Out-patient Department also interferes with the efficiency of the work done there. The physician in attendance has not enough time to go fully into the more important cases, and neither time nor energy to carry out the teaching of the students as thoroughly and practically as it ought to be done. The work of an out-patient physician to a children's hospital includes not only the examination of the children and prescribing for them, but also the instructing and impressing of the mothers in such a way as to make them able and willing to carry out the instructions given. It is extremely strenuous work, and no man is at his best after more than two or three hours of it.

(b) *More Convalescent Accommodation.*—A child who is recovering from one of the common acute diseases—such as measles, whooping-cough, severe diarrhœa, pneumonia, or influenza, even when the attack has not been a very bad one, takes some time before he is quite himself again. Such illnesses weaken, for the time, the natural power of the body to resist further infections, as well

as exhausting it in other ways. It follows from this that convalescence is a time when children are peculiarly liable to contract fresh infections such as tuberculosis, or another acute disease (*e.g.* measles after whooping-cough, or *vice versa*). For the same reason, the illnesses that children take at such a time are apt to be of a serious type and often end fatally. In arranging for the treatment of acute diseases, therefore, it is not enough to provide for hospital or home care only; it is scarcely less important to make adequate provision for the children's convalescence being completed under suitable fresh-air conditions. We all know how often an incomplete recovery from one of the above-mentioned plagues of childhood ends in local or general tuberculosis or some other grave infection. Very often such complications would not have occurred, or at least would not have been serious, had the patient had a week or two of fresh air before returning to the more or less confined atmosphere of home and school life.

In Edinburgh, of recent years, much good has been done by such excellent organisations as the Holiday House Scheme, the Children's Holiday Fund, the Gilmerton Convalescent Home, the "Courant" Fund, and others. In many individual instances, also, private thought and energy have arranged much needed holidays for poor children by sending them, with or without their mothers, to country quarters for a week or two. There is still, however, very great need for more systematically organised provision for this sort of holiday; and it would certainly have an excellent effect in lowering the mortality of the city if there were a few easily accessible Convalescent Homes for little children who could not otherwise get a change of air. Such Homes would require to be under close medical supervision, so that the danger of further possible infection such as is inherent in all gatherings of young children could be guarded against and provided for. It would also be very beneficial if a number of cottages could be acquired to which poor mothers could be sent with their children when necessary.

(c) *More Chronic Hospitals or "Cripples' Homes."*—Far more room than is at present available is needed for the treatment of serious chronic ailments such as cannot be taken into the Children's Hospital for want of space. The diseases referred to are chiefly tuberculous disease of the spine, the hip and other joints, and the abdomen; also, to a less extent, chronic diseases of the heart, kidneys, and other organs, severe rickety deformities, and certain forms of nervous disease.

It very frequently happens at present that a child who has been found to have spinal caries or hip-joint disease in an early and curable stage is kept waiting for admission until his disease is beyond cure, and he either dies or becomes a delicate hunch-back or a cripple for the rest of his life.

(d) *An Infants' Hospital*.—It is greatly to be desired that a hospital should be founded in Edinburgh for the scientific study of atrophy and other common alimentary disorders of early infancy by the best modern methods of research. Such an institution would be a most valuable asset to the town and of the greatest value for the treatment of difficult cases. It would be a centre for the investigation of the causes, prevention, and treatment of those disorders which are responsible for so large a proportion of our infantile mortality.

It should be affiliated with the Children's Hospital, in close touch with the Infant Health Centres and Visitation, with the Maternity Hospital, with the Laboratory of the Royal College of Physicians, and with those departments of the University which deal with bacteriology and pathological chemistry; also with the Veterinary College, so that the milk supply could be satisfactorily arranged for and supervised.

(e) *An Improved Milk Supply*.—A great deal has recently been written about the urgent need of a pure milk supply for babies in Edinburgh. I need not, therefore, at present, do more than call attention again to the notorious fact that our milk supply is still disgracefully bad in almost every respect; and that, if successful means could be taken to provide clean and tubercle-free milk for children, one of the most serious etiological factors of a large infantile mortality would be thereby removed.

VIII.—CARE OF MENTALLY DEFECTIVE CHILDREN.

By R. D. CLARKSON, M.D.

IN the following short paper I propose to confine myself as closely as possible to the question of the public provision that ought to be made for such children as are so deeply defective in mind from birth or from an early age that they require care, supervision, and control throughout their lives. It was hoped that all that was necessary for this class would be done by the Mental Deficiency and Lunacy (Scotland) Act, 1913, but since the Act came into force in May 1914 it has become evident that it must be amended. My object is chiefly to suggest for consideration some points on which I think opinions ought to be formed before the war ends and promotion of Bills in Parliament again becomes possible.

The Mental Deficiency Bill was introduced to carry out the recommendations of a Royal Commission that sat from 1904 to 1908. That Commission discovered that many mental defectives were being committed to prison for repeated short periods for trifling offences, that others had numerous illegitimate children, that some became chronic inebriates, that the ranks of the tramps and unemployables contained many of them, and that all were a source of care, anxiety, and expense to their relatives or the State.

The most important principles underlying the recommendations of the Commission were—(First) That mentally defective persons should have the protection that is at present given to persons who can be certified as of unsound mind; (second) that these persons should be helped and protected by the State on the ground of their mental defect and not on account of their poverty or their crime; and (third) that they should be detected by means of the education authority, without any undue invasion of the privacy of the family, and should be brought into relation with some local authority specially charged to see to their needs. It will be seen that the burden of my complaint is that these principles are not being carried out.

The Act is in no way concerned with the prevention of mental defect, but a few words may be said here on that subject. In the present state of our knowledge there is little that can be done to prevent the occurrence of mental defect. The causes of

the condition are numerous and varied. It may result from traumatism or disease of the brain, or from lack of internal secretions essential to its proper growth and development. In a very large proportion of the cases, however, no definite pathological lesion can be assigned as the basis, and the tendency nowadays is to regard all these cases as due to some hereditary taint. It has even been suggested that mental defect is a Mendelian character, and that as such it can and ought to be bred out of the race. For my own part I am convinced that these views are largely erroneous, but a great amount of research will have to be done before we have any sure ground to stand on. This research must extend over years, and must obtain an account of the mental characters of several generations. It is, therefore, one which should be commended especially to general practitioners, but in making it they would need to associate themselves with schoolmasters, employers, and others who have the care of adolescents. Whether the condition is most commonly hereditary or not there can be no question that mental defectives make bad parents, and that the provisions made for their care and control should ensure that no mental defective ever has a child.

A considerable number of the mothers of mentally defective children give a history of ill-health during their pregnancy, or of long or difficult labour. It is, at least, probable that all measures for ensuring health during pregnancy and adequate and prompt assistance during confinement will tend to diminish the number of mental defectives. No case has yet been made out for regarding syphilis as an important cause of mental defect, and though a condition of mental defect may arise from starvation or neglect in childhood, in no case has it been shown to be permanent. The comparatively small class resulting from lack of thyroid secretion would be greatly benefited by early diagnosis. Untreated cases of cretinism have been admitted to the Institution at Larbert at ages varying from $3\frac{1}{2}$ to 8 years.

When we leave the question of etiology and prevention aside, and come to deal with the problem of the public provision for the cases that are already with us, the first difficulty that presents itself is that of defining the group. When faced with this difficulty the Royal Commission on the care and control of the feeble-minded applied to the Royal College of Physicians, and were supplied with definitions of four classes into which all cases could be divided. The lowest grade was that of idiots who were defined as so defective as to be unable to guard themselves against common

physical dangers. The second class were the imbeciles who could learn to guard themselves against fire, and so on, and were able to do a certain amount of work, but were unable to earn their own living. The third class were the feeble-minded who could earn their own living under favourable circumstances, but were unable either to manage themselves and their affairs with ordinary prudence, or to compete on equal terms with their normal fellows. The fourth class were the moral imbeciles, cases where some mental defect was combined with strong vicious or criminal propensities on which punishment had little or no deterrent effect.

These definitions apply only to adult cases, and in the case of children of the second and third classes the College of Physicians proposed that they should be classified according to the possibility of teaching them to do something for themselves, or to earn their living in favourable circumstances. It may be noted here that as the condition is permanent and incurable it is impossible to define it satisfactorily in the case of children without taking account of their probable adult capacity.

When these definitions were presented to Parliament as the basis of the Mental Deficiency Act some of the lawyers made very merry over them, and especially over that of the feeble-minded, and they were altered. After much discussion the feeble-minded child was defined as one permanently incapable of deriving benefit from the instruction in ordinary schools, and the feeble-minded adult as one suffering from such a degree of mental defectiveness from an early age as to require care, supervision, and control for his own protection or for the protection of others. Imbeciles were defined as those incapable of managing themselves or their affairs, or, in the case of children, of being taught to do so. The definition of idiots was accepted. Important distinctions were made in the Act between the treatment of feeble-minded persons on the one hand and idiots and imbeciles on the other, and, as I shall mention presently, the local authorities for dealing with these groups were different. The Act introduced a further complication by using, without definition, the terms "educable" and "ineducable," and leaving it to the Scotch Education Department to determine in any given case about which there was any dispute which of these terms was applicable. Soon after the Act came into operation the Education Department, or at any rate one of its high officials, promised to provide a definition of these terms, but so far it has not seen the light.

A great deal of work has been done in the way of devising tests for mental defect in children. One of the best, and best known, of these tests is the set devised by Binet and Simon as the result of the examination of a large number of children in French schools, and Binet has defined the feeble-minded child as one who can learn to communicate with his kind by speech and writing, but who shows a retardation of two years, if below nine, or three years, if over nine, in his school studies, such retardation not being due to irregular or insufficient attendance. I have not sufficient experience of these tests to be very sure of my ground, but I do not think that they, or any tests of scholastic capability, are of great value in enabling us to give a reliable prognosis as to whether the subject tested is likely to be able to earn his own living by competition in the open market or not. In confirmation of this I would point out that whereas 63 per 1000 of the children in Glasgow schools were found to be mentally defective, the proportion of defect in the whole population was only 0·25 per 1000. The mentally defective are short-lived, but not sufficiently so to account for this difference, and I believe that many cases classed in school as mentally defective and permanently incapable, as the Act says, of deriving benefit from the instruction there, turn out afterwards fairly decent citizens. Cuddie Headriggs are as plentiful now as when that faithful ploughman was created by Sir Walter Scott a hundred years ago, and like him, they can say that they are "gey gleg at the uptak: there was never onything dune by hand but they learned gey readily, 'septing reading, writing, and ciphering: and there's no the like o' them at the fit-ba'."

If the definition of mental defect could be considered by a Committee of the Pathological Club or by the Royal College of Physicians I believe they would recommend that no attempt should be made to induce Parliament to alter the definition in the Act, but that the border line between those who require permanent care and those who may be permitted to become full citizens should be drawn by specially qualified medical men who should be obliged to take into account not only the mental defect as shown by school work or tests like the Binet Simon, but the whole character and conduct of the boy or girl examined. One who can learn quickly to do anything with the hands, and whose social instincts enable him to enjoy football or any other game, is not a mental defective in the sense of the Act, no matter what retardation he may show at school.

Since the Act came into operation the great majority of mental defectives are certified as feeble-minded, and as a result much useless expenditure of public money is going on, and there is a prospect of a great deal more. It is enacted that no public money shall be spent on a case till it is certified by two medical men, and, presumably in order to make sure of his qualifications for the task, one of these must be approved by the General Board of Control. The Board have seen fit to approve of almost all the general practitioners in Scotland, and the result is confusion and useless expenditure. It is of the utmost importance to obtain the confidence of the public, and this cannot be done if diagnosis and prognosis are uncertain, and if parents are told that wonderful improvement may take place at the magic ages of 7, 14, or 21. Difficult borderland cases will occur, but there will be few indeed that will not be cleared up by two years' testing in a special school and repeated examinations by a properly qualified medical man. I would therefore suggest that the Board should be asked to withdraw its approval of this long list, and that in each lunacy district one or, if the district be large, several medical men should be approved who have wide knowledge of mental disease in general and of mental defect in particular. These medical officers would not only certify the cases, but would, by their advice, assist the District Board in all its dealings with the mentally defective.

There is also need for amendment of the Act in regard to the authorities approved to administer it. The central authority is the General Board of Control in Edinburgh, which is the old General Lunacy Board with the addition of a medical commissioner and several deputies. Its powers on paper are almost unlimited, but it seems to me that it is too easily satisfied that mentally defective children are sure to be well looked after by their parents or guardians. A girl of 18, who had been five years in the Larbert Institution when the Act was passed, was certified under it, and within a year—when her election period had expired and she could no longer be supported by the funds of the Institution—the Board discharged her to the care of a sister. Her family got her various posts as a domestic servant, but owing to her mental defect she could not keep them. She was last discharged from the service of a hotel in Leith Street, Edinburgh, and but for the chance kindness of an acquaintance she would certainly have gone wrong. The General Board should have power to prevent such happenings to any case once certified to them as mentally defective. I believe that the Board would give a great impetus to the care of

the mentally defective in Scotland if they would frame and make public for the guidance of local authorities and others interested in the mentally defective a comprehensive scheme for the whole country co-ordinating the efforts of private organisations and public bodies so as to obtain the greatest possible benefit for the mentally defective at the least possible public expense. I would also suggest that one of the three medical commissioners should devote all his time to the care of mental defectives. The chief local authorities for carrying out the Act are the Parish Councils and School Boards. To the Parish Councils are relegated all cases above or below school age whose relatives are unable, "by reason of the attendant expense," to make proper provision for them, and all "ineducable" cases of school age. All "educable" cases of school age in similar circumstances are to be cared for by the School Boards. Whenever a child is transferred from a Parish Council to a School Board or *vice versa*, it must be re-certified. This is a source of needless trouble and expense. Owing to the method of certification and the vagueness of the definitions, idiots and imbeciles are frequently cared for by School Boards as "educable" feeble-minded persons, and much useless expenditure is incurred in their behalf. School Boards may provide special schools for defectives, but neither School Boards nor Parish Councils may provide residential institutions. That duty is imposed on the District Boards of Control, who have no say in deciding the kind of patients that are to be sent to the institutions they provide. I believe that it would be better if each District Board of Control were instructed to appoint a special committee to care for the mentally defective in their district. The committee should have ample power to co-opt members of the public or members of School Boards or Parish Councils specially interested in mental defectives. They ought always to co-opt some women, because women take a greater interest in defectives than men, and have for many years been the mainstay of the voluntary associations that have done something to ameliorate the lot of families burdened with such children, and of the children themselves. Such committees would deal with the subject on broader lines than is possible for School Boards or Parish Councils, and the anomaly of having a case dealt with first by a Parish Council, then by a School Board, and reverting after sixteen to a Parish Council again, would be done away with. The committee should have power to compel a parent or guardian to make proper provision for a defective child. If the parent

did not approve of the recommendations of the committee an appeal to the Sheriff should be allowed. If proper precautions were taken to see that the Mental Deficiency Committees only dealt with really permanent cases of mental defect—the cases that require care and control for their whole life—there would, I think, be great advantage in the arrangement. It is being tried in England, and is said to be working well.

Nature of Institutions.—The institutions contemplated by the Act are all residential, but School Boards can maintain special schools or classes for cases that are defective but neither imbecile nor backward. The class of case that seems to have been meant by the provision is that now termed feeble-minded. Many imbeciles, however, are still to be found in the special schools in Scotland, and there is every prospect of the system being extended. The only possible result is a useless expenditure of money and effort. It would be much better for the country were small classes to be formed for pupils of exceptionally great capacity than to follow the plan of giving the most capable and best paid teachers small classes of permanent defectives in the hope of teaching them to read, write, and do arithmetic. There are, however, a number of children who fall behind the others of their age for a variety of reasons, and these may quite properly be brought up to the average by special teaching in small classes or in special schools. All cases of permanent mental defect should be cared for by their relatives, or, if these cannot make suitable provision for them, in residential institutions. The Act provides for cases of mental defect being placed under guardianship. If this were taken to mean that mentally defective children could be boarded out as lunatics are boarded out, my experience is that the results would be very unsatisfactory. Normal children who can become part of the family of the guardian, and ordinary scholars of the public school, do well under such an arrangement, but I have never seen it work satisfactorily in the case of a mentally defective child.

At present there are in Scotland two residential institutions—that at Baldovan, near Dundee, for 250 cases, and that at Larbert for 350. Both institutions were founded by voluntary effort, and in the belief that a few years of special training during childhood would probably cure the mental defect, or at all events so relieve it that the child would be able to earn its own living. That expectation has been proved to have no basis in fact. All the best modern opinion is to the effect that for the genuine mental

defective whole-life care is necessary. It has been shown that such cases can and do lead quite happy lives in institutions: that they delight in doing what little work they can, and that most of them are not so readily tired by monotony as normal children. I am of opinion, therefore, that residential institutions should be provided for all mentally defective cases that cannot be adequately cared for by their relatives, that such institutions should be large enough to take in every grade of mental defect and classify them after admission according to their ability, and that each institution should have attached to it a farm and industrial colony to which the children could be drafted as they grow up, and where they could spend their whole lives. There is a difficulty at present in establishing such workshops, because there is no outlet for their products. The work done by inmates on the farm, laundry, kitchen, and house of such an institution could be utilised to lower the expense of maintaining it, but there is a difficulty in disposing of their work. This difficulty has been solved by the Metropolitan Asylums Board, which gets the printing, the book-binding, the upholstery, the mats, the boots and shoes, and a part of the clothing it requires for its large and numerous institutions, done by the inmates of the colony at Darenth. Were the care of the feeble-minded placed in the hands of the District Boards of Control it is possible that similar arrangements might be made in Scotland.

In conclusion I would say that mental defect should be detected in early life. It will always become apparent, at latest, during the years a child spends at school. When it is evident, the case should be notified to the District Boards of Control, and from that time till the case dies, or till it is quite certain that a mistake has been made and that the case is one of delayed development and not of genuine mental defect, the Mental Deficiency Committee of the Board of Control should be responsible for seeing that the case is properly provided for, and is placed in such surroundings that no danger to itself or to others can result. Without this amount of interference with the liberty of the subject and with the supposed rights of parents to do what they like with their children there will always be a certain amount of that social injury and moral damage which the Royal Commission found to be so prevalent, and which the Mental Deficiency Act was introduced to prevent.

IX.—SURGICAL TUBERCULOSIS AND CHILD WELFARE.

By A. PHILIP MITCHELL, Ch.M., M.D., F.R.C.S.

I HAVE much pleasure in complying with the request of the Pathological Club to contribute to this discussion on child welfare a paper on Surgical Tuberculosis in Children.

That surgical tuberculosis among children of all ages is common in Edinburgh and district is unfortunately evident to all who visit our Sick Children's Hospital. To state the extent of this prevalence in exact figures is by no means easy, but I think the following statistics and clinical data clearly show that the disease is sufficiently prevalent to urge more adequate provision being made for its prevention and treatment under a child-welfare scheme.

For example, of the 2770 new cases treated in the surgical out-patient department of the hospital during 1913, 316 (fully 11 per cent.) children were affected by one or other form of surgical tuberculosis—169 with tuberculosis of the neck glands, 39 with Pott's disease of the spine, 22 with hip disease, while the remaining 86 had the disease in other joints and parts. These manifestations of tuberculous disease also constitute a very considerable percentage of all cases treated in the surgical wards of the hospital. It is not uncommon to find at any time that no less than 50 per cent. of the patients under treatment are cases of tuberculosis. These figures are submitted with a full realisation of the inevitable disabilities attending the purely clinical statistics of any hospital. Such statistics must, however, be accepted as broadly demonstrating the prevalence of the various types of this disease treated, and in a general way it is possible to arrive at certain conclusions.

First, it must be stated how much one is struck with the numerous instances of tuberculosis of the glands in the upper part of the neck met with in the large number of children coming for examination at the surgical out-patient department of the hospital. These children as a rule show no clinical signs of tuberculosis elsewhere, and are, except for the local condition, apparently healthy. It is not at all rare for a single member of an otherwise healthy family to exhibit the disease. The high incidence of the disease

in children from two or three years of age is a striking fact. The influence of infectious diseases, notably measles, whooping-cough, and scarlet fever in apparently favouring the dissemination of the disease in the glands is also worthy of note. This fact indicates the great need for children during the convalescence from these infectious diseases being placed under the best hygienic conditions possible. With such frequent localisation of the disease in well-defined glandular groups it is natural to consider it as a first stage in the spread of tuberculosis, and also to inquire as to the channels of infection.

How do tubercle bacilli reach the glands in the upper part of the neck? Invasion takes place either through the faucial tonsils or the adenoid tissue behind the nose. Moreover, these portals of entry are found in many instances to exhibit microscopic evidence of having also been involved by the tuberculous process. This is particularly true of the faucial tonsils. In 38 per cent. of children affected with tuberculosis of the glands in the upper part of the neck the disease has first involved the tonsils. Unfortunately in the majority of the cases in which the tonsils are found to be tuberculous there are no clinical signs to indicate the presence of the disease.

Here the question might be raised, How soon may one suppose that tuberculosis develops in the neck glands after disease has originated in the faucial tonsils? It is quite impossible to fix a definite period, as many factors come into play—the quantity of infective agent, its virulence, and the power of resistance in the body. This leads up to still another question, What takes place after the infection has reached the neck? It frequently happens in children that the tuberculous process is limited to the tonsillar lymphatic gland, and recovered from, without the involvement of other groups of glands, or the disease remains latent until adult life, when a tuberculous abscess appears insidiously in the region of the tonsillar gland. In a few cases the tonsillar gland overcomes the infection, while glands lower in the chain, especially those surrounding the spinal accessory nerve, may caseate and form an abscess at the posterior border of the sterno-mastoid muscle. In other cases the disease gradually descends from gland to gland until the whole chain of deep glands is affected. It is beyond the scope of the present paper to consider more closely the spread of tuberculosis beyond the neck by the lymphatic system.

Let us consider tuberculous disease of the spinal column.

The spinal column is the commonest seat of tuberculous bone

disease in children. Like tuberculosis of the neck glands it is rarely preceded by clinical manifestations of other tuberculous processes, although it may be followed by them. The onset of the disease in a child who has been reduced by one of the infectious diseases, especially measles and whooping-cough, is again a noteworthy feature. There has previously been a latent focus of tuberculosis elsewhere in the body. This has been frequently demonstrated at post-mortem examinations in the bronchial and mesenteric glands. Infection from these or from other tuberculous lymph glands is the common point or origin of infection.

The larger the total number of cases examined the greater is the incidence of the disease in children under five years of age.

Spinal tuberculosis is formidable enough in itself, but its chief importance lies in the crippling and deformity that invariably result when an early diagnosis is not made. It has been stated that not more than 5 per cent. of cases of spinal caries are diagnosed before deformity has set in. Deformity should certainly not be regarded as an inevitable sequel of Pott's disease of the spine. A wider knowledge of earlier symptoms is required, so that much crippling and danger from complications will be saved to the patient by being placed promptly under skilled care. The chronic nature of the disease demands thorough persistent treatment, extending, it may be, over years. It is obvious that this cannot be adequately carried out in the wards of our city hospitals and homes for incurables and cripples. Let us bear in mind that sunshine and country air and good food are essential elements if full justice is to be done to tuberculous children. Convalescent homes in the country must be established if we are to give these tuberculous cripples the best chance of overcoming their disease.

ETIOLOGICAL FACTORS.

Under this heading the two main points which call for consideration are: (1) Predisposing causes; (2) modes of infection.

(1) *Predisposing Causes.*—These include all the conditions which bring about a diminished resistance of the body to tuberculous infection. Bad hygiene, such as being reared in crowded city tenements, insufficient food, and neglect, all have an important influence on the resisting power of the child to infection. This susceptibility may be inherited, as when either parent has been affected with tuberculosis. The almost universal practice in Scotland of artificially feeding babies with cow's milk which has not been previously boiled or sterilised is now a matter of common

knowledge. Further, in the case of breast-fed babies it is frequently found that the breast-feeding has been supplemented by bottle milk. Such observations are of considerable importance in relation to the incidence of tubercle bacilli in milk offered for sale in Edinburgh. As in all large towns, Edinburgh derives its chief supply of milk from country byres which yield about two-thirds of the daily milk supply to the city. The existing legislation is such that there is practically no veterinary inspection of country byres in Scotland. If, even with the adequate veterinary inspection at present existing in our large Scottish towns we know that tuberculosis amongst cows is an extremely prevalent disease, how much more prevalent must it be in those small country byres which are never inspected. It would appear, then, that there are greater opportunities for the infection of children by country milk compared to milk produced in city byres. Recently I carried through an inquiry as to the prevalence of tubercle bacilli in the Edinburgh milk supply, particularly that portion derived from country districts. The results of this investigation showed that of 406 samples of mixed milk collected from the same number of milk shops, 82 samples (20 per cent.) contained tubercle bacilli. The general public know little more about milk than that it is, or should be, a natural product of the cow, that it is brought several times a day to the door, and that it is one of the most important foods for children. The quality of milk (that is, percentage of fat) has generally been the most prominent question with the consumer and the local authorities, so that the more vital subject of infected milk has not received due attention.

The importance of ascertaining the presence of tubercle bacilli in milk is essentially related to the problem of whether such bacilli can produce tuberculous lesions in children.

(2) *Modes of Infection.*—Turning to the question of the various modes in which infection with the tubercle bacillus can occur, we may, for the purposes of this discussion, leave out of consideration all except ingestion and inhalation. Both roots of infection are universally recognised, and there remains to be determined now only their relative importance as portals of entry.

The real solution of this problem is bound up in a study of the relative frequency of the bovine and human types of tubercle bacilli in the different varieties of surgical tuberculosis. Recently J. Fraser and myself, at the suggestion of Mr. Stiles, carried out experiments on these lines with material removed by surgical operation at the Sick Children's Hospital, the results of which

may be briefly stated as follows:—(1) Cow's milk containing bovine tubercle bacilli is clearly the cause of 90 per cent. of cases of tuberculous cervical glands in infants and children. (2) Primary tuberculosis of the faucial tonsils occurs frequently, and must be attributed to the drinking of milk from tuberculous cows rather than to the inhalation of human tubercle bacilli conveyed by dried sputum or the moist spray from the coughing of a consumptive patient. Tonsillectomy is essential in all cases of tuberculous disease of the upper deep cervical glands. (3) Tuberculosis of bones and joints is of bovine origin to the extent of 60 per cent. These results are of great importance from the practical standpoint in regard to prophylactic measures.

Children being large consumers of milk, and milk, according to some, forming such an essential part of their diet, it is quite clear how contaminated milk may be to them a frequent source of infection. Small as is the danger in individual cases, the multiplicity of opportunities gives it considerable importance for children. While the faucial tonsils and the cervical lymph glands must often succeed in killing the small numbers of tubercle bacilli which are frequently present in unsterilised milk, they fail to cope with such large amounts as are ingested by children who are unfortunately being nourished with milk from a single cow with tuberculosis of the udder, or from a small herd harbouring a cow with either tuberculosis of the udder or with advanced clinical tuberculosis. Furthermore, it may be confidently stated that the reason why many children do not present any clinical evidence of tuberculosis in spite of the fact that they are frequently drinking infected milk is to be found in a consideration of the results of certain experiments. These have shown that while inhalation of tubercle bacilli is a certain method of infection even when small doses of bacilli are employed, very much larger doses of bacilli are required to produce the disease by way of the alimentary canal.

Whenever a child lives in close contact with tuberculous parents or relatives it is easy to understand how readily inhalation of human tubercle bacilli conveyed by dried sputum or the moist spray from the coughing of a consumptive patient may occur.

Moreover, it should be stated that surgical tuberculosis occurring under such conditions is invariably of human origin. Amongst children with tuberculous cervical glands this source of infection appears, however, to be very frequently absent. They are in many instances born of non-tuberculous parents.

PRACTICAL CONSIDERATIONS.

The prevalence of surgical tuberculosis amongst children may be summed up by saying that though unable to express it in exact figures there is clear evidence that the disease is sufficiently prevalent to constitute a real danger to the community, and to urge the immediate necessity for some comprehensive and systematic attempt at prevention and cure.

Such questions as these relating to poverty, improper feeding, and housing must be faced. As a practical measure, tuberculin injections would appear to be of value in increasing the powers of resistance to the disease.

Open-air schools are required for children who are definitely tuberculous, tuberculously disposed, or come from tuberculous houses.

The establishment of convalescent homes in the country for the adequate treatment of children affected by active tuberculosis is a much-felt want.

The special care of children during convalescence from measles, whooping-cough, and other acute specific diseases is greatly to be desired.

For the welfare of any community, large or small, the provision of a pure milk supply is of the utmost importance—clean milk of good quality from healthy cows and protected from contamination. The powers at present vested in our local authorities are inadequate, and it seems to me to be our special duty to prevent this large and entirely preventable amount of tuberculosis amongst children.

What is most wanted is a well-informed public opinion which will demand new and more drastic powers for the authorities, and insist upon these powers being exercised to their full extent.

There are three clearly defined methods by which children may be protected from the dangers of tuberculous cow's milk:—

- (1) The elimination of tuberculosis from cows.
- (2) Boil the milk.
- (3) The breast-feeding of infants.

(The remainder of the papers on "Maternity and Child Welfare" will appear in the next number of the Journal.)

EDINBURGH

MEDICAL JOURNAL.

X.—INFECTIOUS DISEASES IN RELATION TO CHILD WELFARE.

By CLAUDE B. KER, M.D.

IN discussing the influence of the infectious diseases upon child welfare the main points to be considered are the mortality for which they are responsible and the sequelæ which follow in their train. The pedagogue might add a third point: the time which these diseases may subtract from the period of education. Personally, I think that there must be very few children, especially of the poorer classes, who are not benefited by the mental rest enforced by a mild attack of scarlet fever or diphtheria, and I believe that the lost time is usually made up very rapidly.

If we disregard this last consideration, then, and limit our attention to the diseases which show a casualty list of what might be described as "killed" and "wounded," we at once exclude from our discussion those minor infectious ailments such as chicken-pox, rubella, and mumps, which are merely responsible for a long list of "missing" from school. I will merely remark that the hospital isolation of such cases, when practicable, should be encouraged if only to give the children of the slums the benefit of the good air, the liberal and wholesome feeding, and, perhaps most important of all, the early and regular hours which internment in the average modern fever hospital entails.

As regards the more serious infectious diseases they fall naturally into two groups: those which, like the poor, may be said to be always with us, and those which may be described as occasional visitors. Into the first group such diseases as scarlet fever, diphtheria, measles, and whooping-cough, all of which are seldom absent in great cities, will naturally fall. Enteric fever need hardly be considered. In Edinburgh it is a dying disease, and latterly has not affected more than a dozen children annually.

It is not, moreover, a very serious illness in children, and our case death-rate for those of under ten years of age is not more than 6 per cent., the period from ten to fifteen years showing the still lower mortality of 3 per cent.

If enteric fever is moribund in this city, typhus fever, which may be classed with the group of infectious diseases which occur occasionally, may be said to be absolutely dead. Here, again, my experience has been that it is not very fatal to children. On the contrary, it is almost always benign, and there appears to be no use to consider it. It is different with cerebro-spinal fever, which of late years has been more common in the city, and which has shown two distinct periods of moderate prevalence in 1907-8 and in the last two years. Its high fatality-rate is well known, and it is especially fatal in infants. In the 1907 outbreak we lost no fewer than twenty out of twenty-one infants under one year of age. After the age of two years the case death-rate becomes considerably less, and children of over five often do comparatively well. But the outlook as regards the treatment of this disease is hopeful. Antitoxic serum is beginning to give very fair results, and the fact that the dissemination of the infection by healthy carriers is now well understood and that the bacteriology of the disease, with all respect to the somewhat disturbing views recently expressed by Hort, is fairly established, leads us to hope that if, as is probable, we are to expect a greater familiarity with this dangerous disease in the future, we shall be reasonably well equipped for dealing with it both administratively and therapeutically. It should be remembered, however, that cerebro-spinal fever is one of the diseases which is formidable in its sequelæ as well as in its death-rate. Nerve deafness is not uncommon, and epidemic prevalence of the fever has been said to increase the rate of admissions into asylums for deaf-mutes. Permanent blindness may also result, and varying degrees of hydrocephalus are also observed. But it is reassuring to know that serum treatment has very much reduced the number of these accidents, notwithstanding the greater proportion of patients who survive an attack. And this, I think, points the moral that, when bacteriological research has explained the causation of diseases like scarlet fever and measles, similar improvement in the incidence of their sequelæ will be observed. Poliomyelitis is another occasional visitor which is chiefly to be dreaded on account of its incurable sequelæ. Research here may also give important results.

Smallpox is the only other infection in this group of diseases

which requires mention, and to some it may appear that even mention is unnecessary. But it must never be forgotten that in the days before vaccination the age-incidence of the disease was much as is that of measles to-day, and in recent epidemics in insufficiently vaccinated towns the children have suffered most. In Gloucester, where the vaccination default had reached the astonishing level of 85 per cent., no less than 64 per cent. of the patients were under ten years of age. And it is well to remember that vaccination default in Edinburgh is increasing. Some recent small outbreaks in the South have only been limited by the most strenuous public health work, and in less skilful and energetic hands such an outbreak as that at Bristol a few years ago could hardly have failed to become a great epidemic. The one good feature in the outlook is the fact that the adult male population of the country has been for the first time in its history compulsorily revaccinated by the war, and that this is a great protection no one can deny. None the less, I do not think that any recommendations on child welfare can be complete if they do not include a strong representation in favour of really compulsory vaccination, and also compulsory revaccination on leaving school, as the rational means of protection against this very fatal and disfiguring disease.

We now must consider what, after all, are the important diseases: those that are practically endemic in all large communities. The public appears to regard measles and whooping-cough as trivial and diphtheria and scarlet fever as serious. How far is this attitude correct?

Scarlet fever was still a dangerous disease in the middle of last century, but its virulence has steadily declined, though its prevalence is probably as great as ever. In Edinburgh during the last few years, although very prevalent, it has only been responsible for about 0·12 deaths per 1000. Quite possibly it may once more become virulent, but in the meantime it is one of the milder infections, and its case death-rate in hospital seldom exceeds 3 per cent. and has been as low as 1·2 per cent. Its greatest incidence is in the second five years of life, and the sixth year provides the greatest number of cases. The highest mortality, however, occurs in the first quinquennium. Susceptibility to the fever decreases as age advances.

Diphtheria is of course justly dreaded, but since the introduction of serum treatment and bacteriological aids to diagnosis it has become much less formidable than it was. In 1914, when the

disease was at once more prevalent and more virulent than we are accustomed to in Edinburgh, it was only responsible for a mortality of 0·29 per 1000 and a case death-rate in hospital of 10 per cent. Of late years we have been accustomed to case death-rates of 6 or 8 per cent., and in one year it was as low as 4 per cent. As regards age it is most common in the first ten years of life, and particularly from two to five years. It is also most fatal in young children.

If we turn to measles we find that in the years when it is most prevalent it causes such mortality-rates as 0·41, 0·40, and 0·37 per 1000, and even when the outbreaks are small 0·17 per 1000 is the lowest rate in the last ten years in Edinburgh. It is to be noted that this lower figure is higher than that of scarlet fever. And that this is not entirely due to the fact that in a measles epidemic much greater numbers of individuals are affected than is the case with scarlet fever, is shown by the fact that the case death-rate for the last nine years the disease was notifiable in Edinburgh was 3·25 per cent. This, even, is an obvious understatement, as the notifications included many cases of rubella, and 4 per cent. would be probably a fair figure. During the same period this percentage was only once exceeded by scarlet fever. Measles is most common and most fatal in the first five years of life, and is particularly dangerous in children of under two years of age.

Whooping-cough much resembles measles in its age-incidence and in its destructiveness. It causes even a higher mortality-rate per 1000, such figures as 0·57, 0·40, 0·51, 0·37, and 0·35 occurring in recent epidemic years. It is, then, the most destructive of these four common diseases. As there is no notification we cannot calculate the case death-rate. It has been estimated at under 5 per cent. In hospital the cases are usually admitted because they suffer from complications, and as a result the case death-rate is very high—from 11 per cent. to 18 per cent., or, roughly, double that of hospital-treated diphtheria. As in measles, it is the very young who suffer most, and infants of under six months are distinctly more liable to develop whooping-cough than measles.

The extent of this massacre of the innocents by these two diseases is well exemplified by the following figures.

Total deaths (in four consecutive years):—

		Deaths under 5 years.	Deaths under 2 years.
Whooping-cough	. 512	499	386
Measles	. 372	353	265

SEQUELÆ.

Diphtheria is not a disease which is troublesome or dangerous through its sequelæ. The paralysis is very short-lived, and inter-current complications of importance are rare. If care is taken to avoid undue exertion the heart is unlikely to give trouble after discharge from hospital, and soon regains its tone. Scarlet fever very occasionally leaves kidney disease behind it, but in my experience this is rare. Valvular cardiac disease also may start during an attack, but this has been estimated at so low a figure as 3 per 1000 cases, and probably this is not much understated. I propose to leave the question of otorrhœa to the otologists. It is a common complication, but, if the ears are kept clean, does not leave much deafness at the time of the attack, nor is obvious mastoid disease at all common in hospital. It will be interesting to hear of the more remote results. I should be inclined to think measles is responsible for more damage. It is interesting to note that a recent investigation of the relation of scarlet fever to life insurance resulted in the conclusion that the disease made little or no difference to the prospects of insured persons.

When, however, we come to measles and whooping-cough the sequelæ are more important. Measles has been described as an essentially "tuberculising" disease, and many of the broncho-pneumonic conditions which follow it become tuberculous. Emphysema and chronic bronchitis are not uncommon. Otorrhœa is, as I have suggested above, probably even more serious than in scarlet fever. Eye troubles leaving opacities of the cornea and so forth are not infrequent. It has been alleged that measles predisposes to certain nervous diseases. This is against my experience, and I am inclined to believe that too much stress may be laid on the fact that a child has had measles. After all, few children in big cities have not had measles.

Whooping-cough leaves behind it bronchitis, emphysema, tuberculosis, dilated and strained hearts, and hernia. The great prevalence of these two diseases increases the importance of these after-effects.

PROPHYLAXIS.

It is difficult to see what more can be done as regards scarlet fever and diphtheria. There is no tendency to underrate their importance, and they are dealt with as thoroughly as our knowledge of their epidemiology permits. We would undoubtedly be considerably aided if research could determine the etiology of scarlet

fever, and, when its unknown cause can be put under the microscope as is that of diphtheria, the control of the disease will be a more simple matter. Diphtheria is undoubtedly spread in schools by the common use of towels, pencils, and so forth, but as long as carriers of the bacillus are as common as they are it is perhaps unfair to blame the schools too much. It is by no means certain, moreover, that schools play much part in the dissemination of scarlet fever.

The real crux of the question is the prevention, or, failing that, the management, of measles and whooping-cough. An American writer has justly observed that a child dead of whooping-cough is just as dead as a child dead of plague, and that if 10,000 persons died annually in the States of bubonic plague, as they do of whooping-cough, the world would put America in quarantine. We might say the same of measles. The figures I have already given show that these two diseases are really more destructive than those illnesses of which the general public is frightened. But prevention is almost impossible. In both diseases infection is usually spread before definite symptoms are recognisable, and the most we can do is to limit infection as much as possible. The aggregation of very young children in schools and nurseries seems a mistake, but the common stair affords almost equal possibilities of infection. That the illness is often brought back from school and given to the infants at home is very probable, but the closing of schools is not always successful in limiting outbreaks. Much can be done by the education of parents and of teachers, and the former should be warned of the importance of colds in the head when measles is prevalent. Health visitors should do all they can to spread knowledge of the danger of these diseases and of the necessity of getting the children to bed in the early stages of illness. Probably nearly all the chest disease which is responsible for the death-rate in both instances is contracted during the early unrecognisable stage, and if children exposed to measles were kept strictly to bed from the first cough or sneeze the mortality would be much reduced. As it is, the children in this stage are often turned out to play on damp stairs and wet streets.

It is to be hoped that research as regards these two diseases will be encouraged. The bacillus of whooping-cough may be accepted as the cause of the illness, and vaccine treatment is already employed. The results are disappointing at present, but may improve. Preventive vaccination, however, for infants might be worth considering, and should be tested on a large scale. But

as regards measles we are quite in the dark, and much research is needed. Here, too, vaccination may have a future. The obvious thing to do is to postpone the age at which these diseases are taken if they cannot be prevented altogether. If that could be effected the mortality would be hardly worth considering.

Edinburgh is one of the few cities which has for years provided a certain amount of isolation accommodation for measles and whooping-cough and has dealt with large numbers of children from the poorest parts of the city. The death-rate is usually high, but the satisfactory thing is that many children are saved who would certainly have died at home. Isolation is of no use whatever in preventing the spread of these infections. That has already occurred before the nature of the illness is recognised, and in the case of whooping-cough it is at least probable that by the time the average patient reaches hospital he has ceased to be infectious. But hospital treatment has saved, and will save, many lives, and the scheme brought forward by the Medical Officer of Health includes the provision of more beds for whooping-cough. The free ventilation of good wards and the possibility of actual open-air treatment not only helps the pulmonary cases in their acute stage but also reduces the nervous irritability of whooping children. And, perhaps most important of all, it lessens the probability of subsequent tuberculosis. But it is no use crowding the patients into insufficient ward space. In both diseases ample floor space per bed is required, and the difficulty is to provide sufficient accommodation in the rush of an explosive epidemic. It is a matter of opinion, but I would give these dangerous diseases preference over scarlet fever, leaving cases of the latter disease at home in the better-class districts. The reduction of the detention of scarlet fever to, say, four weeks instead of six would also increase the available space.

XIA.—DERMATOLOGY IN RELATION TO CHILD WELFARE.

By NORMAN WALKER, M.D.

THE skin diseases which seem to be concerned in the present inquiry are pediculosis (and impetigo), ringworm (and favus), and scabies.

Pediculosis capitis with its so frequent accompanant impetigo contagiosa is the commonest of the skin affections of childhood, and occurs in an almost unbelievable percentage of female children among the poor. Not that it is confined to any one class. There are few (adequately peopled) nurseries, even among the rich, where it does not occasionally occur, and happy is the mistress of a girls' boarding school who can truthfully say she has no experience of it.

The fecundity of the pediculus is remarkable: two healthy impregnated females can raise in two months an army of 18,000. It is therefore not to be wondered at that everyone living in the house with an infected person soon becomes infected. In the short hair of the male the insects do not so readily find quiet resting-places, and the careful brushing of the hair night and morning by the careful adult are disturbing, but in the young girl and in the older female who has ceased to care for her appearance, they find ideal conditions and multiply rapidly. It is well to note that in such cases the host is often entirely ignorant of their existence. Examination may disclose "nits" by the hundred and individual parasites scuttering for cover, and yet the patient and her mother will indignantly and quite honestly deny any knowledge of their existence.

Treatment is simple and eminently satisfactory; its details do not concern us in the present discussion. What is imperative is to recognise that pediculosis is a disease of (at least of all the female members) the household, and that it is a mere waste of time to treat one individual member.

The disease is frequently introduced into a cleanly household by the schoolgirl. It is interesting to note that the rules regarding hairdressing become as a rule more and more severe as the social position of the pupils rises. Compulsory pigtails are

readily submitted to in girls' high schools, as are strict sumptuary laws regarding the breadth of ribbon with which the plaits are tied. I find it difficult to believe that it is really so difficult as some maintain to introduce similar regulations in Board schools.

The secondary effects of pediculosis, impetigo contagiosa and adenitis are important. Impetigo, though usually a simple, easily cured condition, is due to the streptococcus, and every now and again serious complications develop, while the glands may suppurate and require surgical interference.

Ringworm and Favus.—These diseases, both due to fungus growth, have a good deal in common, but they have this important difference, that while ringworm tends to disappear as the child reaches the age of fourteen, favus lasts for life.

Ringworm is essentially a school disease, and can only be dealt with efficiently through the school. The Edinburgh School Board five years ago opened a ringworm school which has been worked in close co-operation with our skin department. One can look back with some amusement to the indignant protests which the proposal aroused. George Watson's and George Heriot's schools, we were told, would be deserted, and one individual foretold that medical students would seek other schools of instruction where such dangers were not placed so close to the Infirmary as is our ringworm school in Lauriston. Much excellent work has been done by the nurses of the school, and still more could be done by a larger staff of visitors who would look out for possible infection in children below school age, and could preach the doctrine of prevention in the already infected houses.

Pediculosis is especially the disease of girls; ringworm is, I think, rather more common in boys. I have suggested that all school-girls should wear their hair plaited; all schoolboys up to the age of eleven should have their hair clipped every three weeks. Where one member of a family is infected, all the rest, boys *and girls*, should have their hair cut short—the shorter the better; have it washed, and anointed with an antiseptic pomade daily. This in most cases will prevent them from catching the disease; and if it does not, it enables one to recognise the earliest sign of it. It is the unrecognised cases which spread the disease. As the school organisation gets more and more efficient the cases will grow fewer and fewer, and I shall be disappointed if in ten years ringworm is not a comparatively rare disease in Edinburgh.

Favus is fortunately a much rarer disease than ringworm, and unless taken very thoroughly in hand accompanies the sufferer to

his grave. Edinburgh has an unfortunate and not undeserved notoriety in this connection, for though cases crop up in the west and occasionally in country districts, there is no denying that its headquarters are in the capital. Prior to the establishment of the ringworm school the outlook for such cases was gloomy. Excluded from the ordinary schools they got no education, they entered the blind-alley occupations, but even from them they were often thrown out—the boys to join the criminal classes, and the girls the lowest class of street-walkers.

Persistent, persevering treatment is required. Each case should be put in charge of an exceptionally tactful visitor who will not leave go until the doctor is satisfied that a cure has been accomplished.

Before leaving these diseases I feel compelled to say a word about Sunday schools. Before the establishment of Lauriston School it was a not uncommon experience to find our ringworm and favus cases—excluded from the day schools—regularly attending a Sunday school; in summer not infrequently two or even three. This is clearly wrong, and suggests a necessity for some co-operation between the sacred and the secular authorities. It is no doubt well that these children should learn their Shorter Catechism, but it is rather unfair that they should infect three or four fellow-learners while they do.

The Churches are at present in a mood to co-operate; they might do worse things than found a joint ringworm Sunday school. I have no dread of infection when the existence of the disease is known and recognised. And as these words will probably come under the notice of the laity, I will add that those schools in which some particular religious sect is especially concerned, would do well to be a little more particular in such matters than some of them are.

Scabies.—If scabies continues to spread as it has done during the past twelve months the Duke of Argyll will have to get to work again.

In parts of Scotland to-day scabies can hardly have been more prevalent in the days to which the above oblique allusion refers. "The" itch is a family disease, and can only be stamped out by treating every affected member of the family. I have read with much interest, and not a little self-reproach, Professor C. J. White's Presidential Address at the Fortieth Annual Meeting of the American Dermatological Association (the *Journal of Cutaneous Diseases*, June 1916) on "How Can we Improve our Hospital

Service?" and I feel that I cannot put the problem of managing scabies better before you than by quoting verbatim from his article:—

"Certain members of our department have been noting for some time that among our really poor hospital patients it was perhaps a comparatively easy matter to rid a child of his scabies, but that it was a very difficult matter to keep him from re-infection. For some time it has been our rule that the social service worker or the clinic visiting nurse shall go to the house of every indigent patient with scabies, send to the hospital for examination every suspect found at the home, and see personally that each infected member of the household and his body and bed linen are properly treated. I want to illustrate some of the difficulties in the execution of this good rule by the following incident: A re-infection of scabies came to our notice, and, in consequence, our clinic visiting nurse was sent to a small New England village, perhaps twenty-five miles distant from Boston. At the next clinic conference Miss Olsen made the following report, which I quote verbatim:—

"The people were clean, apparently fairly comfortably well-off Americans. The father, mother, and four children had scabies. Mrs. B. seemed sure that she knew the source of their infection, and this is the gist of the story:—

"A family named A. lived near the B.'s. The former family is neither neat nor clean. A daughter works occasionally for the women of the village. At the time of the B.'s first attack, Miss A. was there and was seen scratching. Another A., a son, works with logging gangs on the road, and is intimate with many of the boys in the village, with whom he goes on hunting and camping trips. Recently, just before the B.'s second attack, this boy stayed overnight with the C.'s, neighbours of the A.'s, and parents of Mrs. B. Several days afterwards Miss C. began to itch. She visited her sister Mrs. B. and played with the children, etc. A few days later the B.'s began to scratch, and at this time were visited by the niece of Mrs. B. from the town of X. Mrs. D. wrote to Mrs. B. that she and her children itched, and that she had visited her husband's mother, Mrs. E., in a nearby town, who had also been infected. With the C.'s lived a boy F., who goes to school in Boston, and this boy was also itching. Another family, neighbours of the A.'s, named G., were desperately trying to rid themselves of the common plague, and Mrs. B. stated that she was pretty sure "that several other families in the vicinity had been

infected, primarily through the A.'s, who," she says, "never take a bath," and who have had an itch for a number of years.' Thus, you see, our nurse has traced the infection to at least seven families scattered about in neighbouring towns of Massachusetts. Such an epidemic was, of course, beyond our control, and we presented the facts to the chairman of the local Board of Health and asked that he take action at once."

So much for the infective diseases. I will conclude with one or two more quotations from White's address.

It is rather humiliating to learn that "A recent canvass among the members of the American Dermatological Association reveals the fact, as based on a knowledge of forty-eight replies, that eighteen skin clinics enjoy the privilege of their own social worker, that seven have social workers connected with the hospital whose assistance can be invoked in cases of need, and that twenty-three clinics are as yet wholly without this modern adjunct of efficiency"; and that "... before the patient leaves, the doctor tells him the exact day on which to return, and designates whether or not the clinic visiting nurse or the social worker is to follow him to his house in order to examine the home conditions, to oversee the treatment, and to win his confidence if he needs mental or physical stimulation or financial assistance."

"We must remember one fact, however. The comfortable and sanitary and easy life in a well-equipped hospital may produce a rapid cure or a distinct amelioration of symptoms, but will the home conditions permit the continuance of these favourable results? Not always, as we of experience know. I remember so well a case of prurigo mitis in a young French girl. She would come to us in a most distressing condition; she would be bathed, properly clothed, suitably fed, and comfortably rested, and in a few weeks go home apparently cured. A few months later, however, the drama would be repeated, and in those earlier and unenlightened days we seemed powerless to help ourselves. Now, social service and visiting nurses, with funds for the needy at their disposal, have more or less done away with such unfavourable results."

There is no reason why we should not do likewise. All that White says as to the disabilities and difficulties under which he formerly worked, I can corroborate from my own experience; and I feel sure that if the machinery were devised we should find the social workers of Edinburgh no less willing and helpful than their Boston sisters.

XI_B.—DERMATOLOGY IN RELATION TO CHILD WELFARE.

By R. CRANSTON LOW, M.B., F.R.C.P.

THE two diseases with regard to which something might be done are *tinea capitis* and *pediculosis capitis*.

Tinea Capitis.—This is undoubtedly most prevalent in children of school age. Those under school age are often infected by their brothers or sisters who are of school age. *Tinea capitis* is not a condition in which health visitors could be of any use. It is entirely a matter for the medical man. If this disease is to be stamped out (and there is no reason why it should not be, except for isolated cases) some more thorough methods must be applied than at present exist in dealing with it. I do not see how this is to be done without some system of notification, to be followed up by compulsory treatment and disinfection of the houses after cure. It is well known that in Paris, with isolation of the cases in special hospital schools and X-ray treatment, the disease has been almost stamped out.

Notification of course presents many difficulties. I very much doubt if the average practitioner is capable of diagnosing ringworm sufficiently accurately to notify with any satisfactory results; but this might be got over by all "suspects" being submitted to an expert appointed for the purpose by the public health authorities. As present there is far too much treating of ringworm by unqualified persons, such as herbalists, veterinary surgeons, chemists, etc. As the disease is a contagious one it should be an "offence" for any but a qualified medical man to deal with it.

Isolation.—At present no steps are taken at all to isolate cases. The children are not allowed to go to school, except those who attend the special school in Lauriston Place. Most of them run about the streets all day and spread the condition. I do not consider it sufficient to keep the head covered. The diseased hairs, containing fungus, break off and fall on to the child's clothes. There the fungus grows, and such children must be radiating spores in all directions. These children travel in tram-cars and other public conveyances. They frequent the public playgrounds, and often attend regularly at Sunday schools. I do not see how much

advance is to be made without isolation of all cases till cured. In the majority of cases it would be only just and right to provide treatment of such patients. The parents are compelled by law to send a child to school, and yet when a child is infected at school the parent has usually all the trouble and expense of curing the disease.

Disinfection.—It is my opinion that the schools are very much to blame. I have the feeling that disinfection of the schools is not sufficiently carried out. If disinfection is carried out by formalin, it is not likely to be effective. Fungi of all kinds are difficult to kill by formalin. All pathologists know well how, if a specimen is kept in formalin solution, and is not kept completely covered with the liquid, the surface soon becomes overgrown with fungi, even although the air in the jar contains a considerable amount of formalin vapour. Since the war broke out I have seen two soldiers with small-spored *tinea capitis*. In both cases the soldiers were billeted in schools, and almost certainly became infected from the building. At present also no steps are taken to disinfect a house after a case of *tinea capitis*. I remember a patient in Donaldson's Hospital who was cured after X-rays and other treatment. He was back at Donaldson's Hospital for two months, and remained well for that time. Then he went home for a few days' holidays, and within a few days of his return was found to have again contracted ringworm, probably from living in the same room in which he had lived when he had the first attack of ringworm.

The question naturally comes up as to where and by whom all these cases of *tinea capitis* are to be treated. Here again, as it is a contagious disease, I think it is the duty of the public health authorities to take the matter up. I do not think it is right that the voluntary hospitals should be left to treat all the cases, as is done at present. The public health authorities should appoint an expert to supervise the treatment of children of all cases whether of school age or not.

Pediculosis capitis is a condition in which health visitors might be of some use. It is easily diagnosed and not likely to be mistaken for anything else. The first thing that should be impressed on the parents is that the condition is not a "sign of strength," as so many think, and therefore to be encouraged; and, secondly, parents could be instructed how to use paraffin to cure the condition instead of the usual futile and laborious combing of the heads with a fine comb. Much could be done to prevent the spread if all girls wore

their hair in pigtails. The practice which the poorer-class parent has of crimping the hair to make it stand out all round makes it very easy for the pediculus to transfer itself from one head to another, as it must be remembered that a few seconds' contact of one head of hair with another is sufficient to transmit the condition. Here, also, I think the selling by chemists of useless ointments and other cures should be prohibited.

XII.—THE ADMINISTRATIVE INSTITUTIONS NECESSARY FOR THE WELFARE OF CHILDREN UNDER SCHOOL AGE.

By MRS. LESLIE MACKENZIE, F.E.I.S., Vice-Convener of the Child Welfare Committee of the National Union of Women Workers, Scotland; Deputy Chairman of Edinburgh Insurance Committee.

TO-NIGHT I should like to put before you some of the administrative institutions necessary for the welfare of children under school age.

Most of the newer phases of child welfare work have become possible on an adequate scale only since the passing of the Notification of Births (Extension) Act, 1915. In 1907, as you know, the first Notification of Births Act was passed, but it was only permissive. A local authority might or might not adopt the Act, and the Act asked only for the notification to the Medical Officer of Health of all *living* births.

Many towns adopted the Act; for example, Aberdeen, Dundee, Edinburgh, Glasgow, and several towns in Lanarkshire, representing nearly 60 per cent. of the population of Scotland. The local authorities that adopted the Act usually appointed health visitors, either official or voluntary, or both, and during the last seven years much valuable work has been done in organised care of the baby. No town has any better record of voluntary health visiting than our own Edinburgh, with its official health visitor and over 300 voluntary health visitors. The work, however, all over the country was voluntary and often spasmodic. At that time the local authorities got no direct Government grant for such work, and, consequently, had little encouragement to spend much money on it. In 1915, however, an extension of the Notification of Births Act was passed, which made it imperative on every local authority for public health (that is, in burghs, the Town Council, and in counties, the District Committee) to adopt the Act. The adoption of this Act secures that every birth, *alive or still*, shall be notified to the Medical Officer of Health within thirty-six hours. In the application of this Act to Scotland there occurs the following section:—

“Any local authority within the meaning of the principal Act may make such arrangements as they think fit, and as may be

sanctioned by the Local Government Board for Scotland, for attending to the health of expectant mothers and nursing mothers, and of children under five years of age within the meaning of section 7 of the Education (Scotland) Act, 1908."

This new Act gives to local authorities for public health wide powers and a free hand "to make what arrangements they see fit." The local authorities' arrangements, if they are to tackle the full necessities of the case, should therefore include—

1. Help and advice to the mother *before* the birth of the child.
2. Skilled assistance at the birth.
3. Continuous and skilled supervision of the child until it has reached twelve months of age.
4. Medical supervision of all children from one to five years of age.

This last point is a much larger question than we are at first inclined to think, if we remember that, last year, there were in Edinburgh 29,000, and in Scotland 424,364, children between the ages of one and five years. And these are the years when infections such as scarlet fever, measles, whooping-cough, and diphtheria are most deadly, and when, if death itself is escaped, the damage rate is heaviest.

For all this work the local authorities are now empowered to make what arrangements they see fit; and, in order to attend to the health of the mother and child before, at, and after the birth, to the end of the child's first year, the local authorities should secure that sufficient institutions exist to meet the requirements of their population. Such institutions or maternity centres should include:—

1. Consultations for expectant mothers with—
 - (a) Hospital beds for complicated pregnancies.
 - (b) Out-patient clinics for specific illness and common ailments of pregnancy. Arrangements may also be made for feeding necessitous women.
2. Lying-in homes for—
 - (a) Complicated confinements.
 - (b) Confinements that would have to take place in unsuitable homes.
 - (c) A certain number of beds for post-parturient cases.
3. Baby clinics, or infant consultations, where babies may be regularly weighed and examined, and advice given to the mothers as to the proper treatment of the children.

4. A certain number of beds, or, in large centres, a small hospital where babies suffering from malnutrition could be studied and treated. Judging from the number of badly nourished and non-thriving infants as one sees brought to baby clinics all over the country, some such properly organised hospital seems an essential part of any adequate scheme.
5. Milk depôts, with properly prepared milk for infants of all ages where breast-feeding proves impossible.
6. Arrangements for regular home visiting by official and voluntary health visitors, and for adequate reporting.

All these institutions and arrangements must be under the care and supervision of medical men or women, with the assistance of trained midwives, nurses, and health visitors, and be conducted to the satisfaction of the Medical Officer of Health of the district.

We come now to the organised medical care of the children between the ages of one and five years. This is really new. Hitherto, the notification of children suffering from certain infectious diseases, and their removal, if necessary, to an infectious diseases hospital was the extent of the Public Health Authorities' medical care of children. Our magnificent voluntary institutions, such as sick children's hospitals and general hospitals, took the major cases of disease; and, again, voluntary dispensaries attended to much of the minor disease conditions. There was, however, no obligation on any authority to see that ailing children were given the chance of treatment and recovery until the Scottish School Boards were made responsible for the medical inspection of all school children and, later on, for the medical treatment of necessitous school children.

The one- to five-year-old child was again left out. His health conditions came under general scrutiny only when he reached the school at five years of age, and then the damage-rate for the first time became known.

With the toddler arises the first great administrative difficulty. Relatively, the medical inspection and supervision of school children were easy. All children between five and fourteen years of age were already gathered in great depôts in the schools. The organisation necessary to deal with them was largely a matter of appointing doctors and nurses.

With under-school-age children it is very different—they are nowhere gathered in great numbers, and their medical supervision is relatively more difficult.

The institutions suggested to meet life at this stage depend largely on the economic condition of the home. If the mother must go out to work to bring in all or part of the income, somebody or some institution must look after the children not at school. The Memorandum of the Local Government Board for Scotland recommends local authorities to take cognisance of certain institutions that, though not themselves medical, are convenient places for the medical examination of the children, and are easily supervised. Such institutions are now very common in many large centres of population, and ought to be in sufficient number in every locality to meet the needs of toddlers that are not otherwise cared for. For long we have been familiar with—(1) *The Day Nursery* and (2) *Kindergarten* or *Child's Garden*; more recently we have seen (3) *Play Centres* arranged for rather older children; and the latest institution of this kind is (4) *The Toddlers' Playground*.

Take the first of these—the day nursery. I regret exceedingly that our conditions of life make such an institution a necessity. One woman, one job, should be our motto. If a mother is bringing up a young family, her place is in her own home attending to her own children. But, as yet, this is a counsel of perfection. Many a mother must either board out her children from six o'clock in the morning till six o'clock at night in a *crèche* or day nursery, or leave them to the care of a friendly neighbour and the stair, so that she may do her day's work in some other body's house or in a factory, and thus earn a living for herself and her family. But many a mother has been thankful for the care and attention given to her baby by the kindly motherly nurses that one finds in day nurseries. These and kindergartens and play centres have for years been established and maintained by voluntary associations; but the public health authorities are now in a position to secure that organised medical attention and supervision be given to all children attending these institutions.

Here I wish to put in a very strong plea for the organisation of babies' playgrounds, or, as we say here, the "toddlers' playground." The Edinburgh voluntary health visitors became greatly impressed with the poor condition of many of their "ex-babies." Many a fine infant of twelve months, healthy and actively growing when they left off visiting it, seemed to dwindle into a very puny, listless, neglected little mortal at eighteen months or two years, without any joy in life, and many of them without the will or capacity to play. On realising the case of

these toddlers the Public Health Committee agreed to finance an experiment. A suitable open space, with covered shelter and sand-pit, was secured in a congested area. Toys were collected, mostly from friends. A very competent health visitor (a married woman) was appointed a play mistress, with two or three voluntary younger assistants. From homes where there were a young baby and several school children, toddlers were chosen on condition that they were brought clean to the playground, and that the house was cleaned and the dinner prepared when they returned home at one o'clock. Thirty or forty children, ranging from one and a half to three or four years of age, were enrolled. Our first shock was the condition of head, body, and clothes, and, next, the filthy personal habits of the children. Parents were shown their duty in these respects, and, after a few weeks' pressure and help, the Assistant Medical Officer of Health, who visited the playground periodically and weighed and examined all the children, could report that heads were clean, clothes clean and adequate, and general conditions greatly improved. One striking feature was what might be called "nose drill." At first noses were constantly "running," and cleaning noses seemed the day's work. But after a few months of the daily open-air life the discharges dried up and nose conditions became normal. The children were taught to play, and at first very few knew how. They sat cringing in corners, and were very difficult to amuse or rouse. But before long child nature reasserted itself, and to-day the "toddlers' playground" has a noisy, joyous, boisterous, free and safe crowd of really healthy, happy children, preparing to be drafted on to the kindergartens, where mind and manner will be further prepared for the elementary school at five years of age.

The Medical Officer of Health is greatly pleased with the experiment, for it has not only improved the life of the toddler, but awakened the conscience of the mother and raised the standard of their homes, and he has sanctioned the opening of other four playgrounds for toddlers.

All such institutions may now become health centres of the highest order, and form the gathering ground where the Medical Officer of Health can survey a large number of the otherwise widely scattered section of his practice. It should now also become the duty of the official health visitors to report to the Medical Officer of Health the health condition of toddlers as well as of the babies in the home, and parents should be directed

to get medical attention for these, either from their own doctor, the dispensaries, or at the children's clinic.

Again, let us recur to that very elastic phrase in the Memorandum, "The local authority may make what arrangements they see fit for attending to the health of . . . children under five years of age." It should be the aim of all local authorities to maintain adequate treatment for all children suffering from infectious diseases, and to secure complete freedom from the sequelæ of such diseases.

This is no new part of public health work, and it is a section of the work that, during the last twenty years, has largely occupied public health departments; and one has only to compare the early death-rates from smallpox, typhus, typhoid, and scarlet fever with those of to-day to realise what twenty years' untiring work has done in this field. But what has been done both for the death-rate and the case-rate of smallpox, typhus, and typhoid in the adult population must be done for measles, whooping-cough, scarlet fever, and diphtheria if we expect to make any striking difference on the death-rate of children from one to five, or during school age. Both the death-rates and the "damage-rates" from those infections are excessive, especially in very young children, and the damage from their after effects is often permanently disabling. School Medical Officers' reports, year after year, prove how many children of school age suffer from the after-effects of the early infantile infections. Aurists are now satisfied that acquired deafness and ultimate dumbness is largely due to neglected ear trouble following scarlet fever.

In one class of ten girls in the Deaf and Dumb Institution here, six told me that scarlet fever was the cause of their being in the institution.

External eye diseases, and, in many cases, more serious sight defects, are often due to neglected and badly recovered measles.

Whooping-cough is in itself very deadly in young children, and in badly recovered cases is a fruitful source of early lung trouble.

To reduce the annual toll of deaths and damaged young lives all local authorities should see it to be their duty to furnish and maintain adequate hospital accommodation for all infectious cases that cannot properly and safely be nursed at home. How many working-class houses are fitted for becoming infectious diseases hospitals? This, no doubt, means further developments in the methods of discovering infection, and a large increase of hospital accommodation and nursing staffs. But I cannot see why we, as a

nation, go on lamenting the excessive death-rates of infants and children and suggesting all manner of voluntary palliatives so long as the public health authorities have not brought into operation their full statutory powers. It is not for want of powers that we are allowing thousands of children to die and thousands of others to be maimed for life.

In addition to adequate hospital accommodation, every local authority should maintain a sufficiency of convalescent homes. Here I plead not for palatial buildings, with highly trained and highly paid staffs, but for cheaply built commodious houses in the country and at the seaside, with warm-hearted motherly women, who will see that the children have abundance of food, sleep, warmth, play, and loving-kindness. A few weeks of such treatment after an infectious disease, and before the return to home and school, would, in great measure, prevent permanent damage from badly recovered measles, whooping-cough, scarlet fever, and diphtheria, and would more than repay the nation's outlay, for nothing is so expensive to the community as its manufactured unfit.

With fuller knowledge of the health conditions of all children from one to five years of age, it will be seen that accommodation in sick children's hospitals will require to be greatly increased. Our country has great credit in the large number of fine institutions for this purpose, all built and maintained by voluntary effort. But if all cases requiring medical and surgical care are to have adequate treatment, with no regard to length of stay, it is evident that both Rate and State aid will be necessary to supply accommodation and maintenance. These institutions are doing the essential work of the nation and deserve Rate and State aid sufficient to let them meet the whole necessity of their communities. Our sick children's hospitals, by the nature of their present constitutions, are obliged to aim principally at the treatment only of such cases as require the skill of the higher medicine and higher surgery. So far as it goes, this is admirable. But this conception of the sick children's hospital urgently needs expansion. The cases at present treated are very largely the serious end-products of a very prolonged process of disease. If we are to aim at the ultimate reduction in the numbers of serious cases, we must establish institutions whose primary business will be to treat so-called "minor" diseases "to a finish." How far such institutions may come as a natural outgrowth of our present sick children's hospitals, I am not able to say; but, from the thousands of cases

treated within the last few years at the school clinics of Scotland, I am satisfied that our present hospitals are entirely out of touch with huge numbers of cases that require hospital treatment of some kind.

The Memorandum also clearly laid it down that a local authority, in making arrangements for such special work as the care of eyes and ears, nose and throat, teeth, etc., should take full advantage of existing institutions for such work; and where no such institutions exist the local authority may establish them.

The local authority may also make arrangements for training and instructing mothers and expectant mothers in the proper feeding, clothing and nursing of children. Institutions for this purpose are called *Schools for Mothers*. The term "Schools for Mothers" has been used somewhat comprehensively to include such institutions as Child Welfare Associations, Infant Consultation Centres, Mothers' Clubs, Babies' Welcomes, etc., where a certain amount of advice and teaching is given to the mothers about the health of themselves and their children. There is, however, a very important place for schools for mothers in the more technical sense of the word. Accordingly, where a local authority desires to establish a school for mothers the simplest course is to arrange with the School Boards for appropriate classes in their Continuation Schools.

In Edinburgh for several years the School Board has conducted most successful schools for mothers. As many as 700 and 800 women have yearly attended classes in sick-nursing, mother-craft cutting out, making children's clothes, and cooking. These classes have been conducted by fully trained nurses and teachers, and at each centre a lady doctor gave health lectures. This system does not, of course, in any way preclude such instruction at Infant Consultation Centres or Maternity Centres as the officers of these institutions may consider desirable, either in the form of individual advice or of class instruction. Such informal instruction will, in fact, be a normal part of the administration of these centres. But schools for mothers in the more technical sense can be arranged for with the School Boards, and such an arrangement should, wherever possible, form a part of the local authority's scheme.

Then, lastly, in the Memorandum of the Local Government Board for Scotland, part of the model scheme for the children under five is, "such records as may enable the local authority, through its Medical Officer of Health, to furnish any child of school age with a certified health schedule for presentation on admission to school."

This is the natural climax towards which the medical superintendence of the health of the pre-school child must aspire. Up to the age of five the health authority is responsible, and ought to be in a position to send the child forward to school with such a definite record that the school authorities shall find it a satisfactory guide in the examination of entrants.

THE CORRELATING SCHEDULE.

The school Medical Officer of Health, instead of relying on the inaccurate information given by the mother or guardian, should be in a position to rely on such a health schedule for a record of the major ailments through which the child has passed on his way to the school.

It is easy to suggest broadly the leading items of the schedule. It should contain a note of the occupation of parent or parents. It should record any disabling conditions, such as congenital rickets, or tuberculosis, or deformities, or other striking ailments or disablements.

It should also, as an index of the general power of resistance, indicate the dates of any lung trouble, such as catarrhal pneumonia or bronchitis. It should also specify any form of tuberculosis, whether in lungs, or bones, or joints, or glands. It should have a sufficient account of the senses, such as inflammation of eyes or eyelids, catarrh of the ears, presence of enlarged tonsils or adenoids, or other nasal or respiratory obstructions. But perhaps, in practice, the most valuable item to record would be the infectious diseases contracted between birth and admission to school. A perfect record of pre-school infections ought to assist any Medical Officer of Health in controlling school epidemics. It goes without saying that the state of vaccination should be recorded. Perhaps it might also be worth recording whether a child has ever attended a day nursery, nursery school, or play centre, or other similar institution. It is important to know how far such institutions act in the spread of disease, and how disease in them may best be controlled. On these broad lines I constructed the subjoined schedule merely as a suggestion for discussion.

CORRELATING SCHEDULE.

Public Health Department—Child Welfare Centre.

Name of Child..... Name of Parent or Guardian.....
Address of Child..... Occupation of Father.....
Date of Birth..... Occupation of Mother.....
Day..... Month..... Year.....

Reference to Baby Card.....

Ailments.	2nd Year.	3rd Year.	4th Year.	5th Year.	General Remarks.
Congenital Conditions					
Pneumonia . . .					
Bronchitis . . .					
Diarrhoea . . .					
Digestive Diseases .					
Tuberculosis—					
Lung . . .					
Bones . . .					
Glands . . .					
Rickets . . .					
Nervous System .					
Eyes . . .					
Ears . . .					
Teeth . . .					
Throat and Nose .					
Vaccination—Date .					
Infectious Diseases.					
Mumps . . .					
Measles . . .					
Whooping-cough .					
Chicken-pox . . .					
Scarlet Fever . .					
Diphtheria . . .					
Attendance at Pre-School Institutions.					
Day Nursery . . .					
Child's Playground .					
Nursery School . .					
Play Centre . . .					
Clinic Attendance .					

CONCLUSION.

In conclusion, I may indicate the magnitude of the problem as shown by the numbers of children of ages over one and under five. In the English Census of 1911, the numbers of such children under five were, males, 1,541,003; females, 1,531,652; total, 3,072,655. In the Scottish Census of 1911, the numbers were, males, 213,489; females, 210,875; total, 424,364.

“These are the armies whose health supervision it is the nation’s privilege to organise. The numbers are large enough to stop all doubts about the necessity or the urgency for such organisation. When the historian of the future wishes to recapture the social strivings of this time, he will look away from the battlefield now and again and study the evidence of the stirring of heart among the women at home. It is one of the most amazing phenomena in the history of the world. If the volume of feeling unloosed by the war had not been such as it is do you suppose that, in the middle of the greatest war of history, when all our resources of wealth and moral are put to the supreme test of realisation, the Parliament of this country would have passed, almost without discussion, laws so far-reaching in their social importance that they constitute a revolution? Do you suppose that, if the mind of the country had not been roused to this emotional intuition into the intimacies of the social life of the multitude, the cry of the child would have been so piercingly clear, and the prayer of the sad mother so readily heard?”

XIII.—DISEASES OF THE EYE IN CHILDREN OF AND UNDER SCHOOL AGE.

By J. V. PATERSON, F.R.C.S., AND H. M. TRAQUAIR, M.D.

FOR the purposes of the child welfare discussion the scope of this paper will be limited to a consideration of certain aspects of those diseases of the eye which in children are apt to produce either complete blindness or such impairment of sight as to impede school education and reduce efficiency in later life. It is not intended to enter into a minute statistical survey of the extent to which such diseases and their effects exist amongst our population, or into an examination of the enormous social, moral, and pecuniary loss which the nation suffers through failure to preserve intact the eyesight of so many of its children. These matters are dealt with adequately elsewhere in the extensive and increasing literature of the subject, in which a large amount of information is available to all those who are specially interested.

The keynote of our present observations is the *preventability* of the larger part of all blindness and impaired vision in children and the enormously preponderating importance of parental venereal disease as a causative factor. More than half of this blindness is the result of syphilis or gonorrhœa in the parents. Next in order come congenital deformities and defects of the eyes such as microphthalmos, infantile glaucoma, etc.

Apart from cases of total blindness there is a second group which, on account of the larger number of individuals affected, must be held to be of great importance, namely, those cases in which the vision, though not completely destroyed, is so impaired as to handicap the child from a very early stage and prevent his ultimately becoming an efficient citizen. The causes are very much the same as in the blind group, with this difference, that so-called strumous or phlyctenular keratitis assumes here a very prominent position. Some forms of refractive error, especially high myopia and high astigmatism, are also present in this group though not in the former. The members of this group, since they are not sufficiently blind to require or obtain the benefits of blind asylums or pensions, receive neither special consideration nor practical sympathy, and are simply allowed to

find their own level as wage-earners. As a result they tend to become relatively submerged and to add to that social sediment which it is the aim of modern medicine to diminish and, as far as possible, eliminate.

VENEREAL GROUP.—We will now specially consider the venereal group of cases, and may conveniently arrange them under three headings:—

- (a) Ophthalmia neonatorum.
- (b) Interstitial keratitis.
- (c) Other congenital syphilitic conditions.

A. OPHTHALMIA NEONATORUM.—The term *ophthalmia neonatorum* is in some respects unfortunate, as it does not connote a definite disease but a clinical condition varying within somewhat wide limits. It includes every form of conjunctivitis commencing in babies less than two or three weeks old. In the absence, however, of immediate bacteriological diagnosis there is, no doubt, some advantage in using a general term, but it should be distinctly understood that it is only the gonococcal form, or infantile gonococcal conjunctivitis, that need be taken into serious consideration, as, with the rarest exceptions, it is this form alone which is dangerous to sight. Of all cases of infantile conjunctivitis a proportion varying from about 40 per cent. to 90 per cent. according to different authors are gonococcal. The disparity of such figures shows that they must depend largely upon the type of case included in the examination and their value is therefore greatly reduced. It is a very simple matter to decide definitely whether the gonococcus is present or not, and of those cases which present the clinical appearance of acute conjunctivitis with a thick purulent discharge with or without involvement of the cornea nearly 100 per cent. are gonococcal. At the same time it is not to be supposed that milder cases are *all* due to other causes.

Ophthalmia neonatorum is not very prevalent in Edinburgh. In the various eye-clinics, which draw cases from other districts also, some 15 to 20 cases are seen annually, and in a recent letter the Medical Officer of Health informs us that since notification began, nearly four years ago, only 61 cases have been notified. In Leith during the last year only two cases have been reported. It is probable that a considerable number of cases escape notification. In Glasgow 473 cases were notified during 1915.

The cause is infection from the maternal passages during labour, or accidental contamination of the eyes with infective material soon after birth. We have not found that babies whose

mothers had been attended by midwives were especially prone to contract this disease.

As already mentioned, practically only cases due to the gonococcus, and not by any means all of these, cause permanent damage to sight. It has been stated, and with much truth, that if all cases were *immediately* brought under, and kept under, expert treatment all babies, otherwise healthy, would recover without serious injury to vision.

About 25 per cent. of all the inmates of blind schools in Great Britain and in the United States of America have lost their sight from this cause. In the Edinburgh Blind Asylum in 1911, of inmates under sixteen years of age no less than 33 per cent. had been cases of ophthalmia neonatorum. Apart from blindness the number of cases of defective vision with or without the loss of one eye must be very large. Fortunately this disease is diminishing somewhat, but its frequency and the severity of its results must still be capable of great reduction by the adoption of adequate measures.

B. INTERSTITIAL KERATITIS.—This common and well-known manifestation of congenital syphilis occurs in children usually between the ages of five and fifteen years. About 90 per cent. of all cases of interstitial keratitis are due to syphilis, and in a very large proportion of these children other well-known signs of syphilis are present. Though the keratitis is the chief and most obvious manifestation of the disease, the whole middle coat of the eye is usually affected to a greater or less extent. In Edinburgh it is considerably more prevalent than ophthalmia neonatorum, but causes less actual blindness relative to the number of cases. In one department of the Royal Infirmary some 25 to 30 new cases are seen annually out of a total of 3000 to 4000 eye patients. The disease drags on for a number of months, often for over a year, and then subsides, leaving more or less damaged eyes. It would be difficult to estimate the amount of defective vision, short of blindness, which is produced, but it is certainly very serious. From 15 per cent. to 20 per cent. of the inmates of blind asylums are blind from this cause. In Edinburgh in 1916 about 20 per cent. of the inmates of the Royal Institution for the Blind had had interstitial keratitis.

C. OTHER CONGENITAL SYPHILITIC CONDITIONS.—Under this heading fall mainly cases of choroiditis and optic atrophy, together with a smaller number of cases of iritis, retinitis, infantile glaucoma, or buphthalmos, depending on syphilitic changes, some

forms of juvenile and congenital cataract, and a few other rarer conditions. Altogether this group accounts for about 13 per cent. of blind children, and, as in the other groups, for a correspondingly large number of cases of defective vision.

These three groups are due to parental venereal disease, and in this respect are preventable. They account for nearly 60 per cent. of the blindness of childhood.

Non-Venereal Group.—We find, then, that only about 40 per cent. of actual blindness in children is due to causes other than parental venereal disease. Of this remainder half is due to various congenital and developmental defects of the eye. These, of course, are not preventable in the ordinary sense of the word, but it should not be forgotten that the majority of such defects are markedly hereditary.

When we come to consider cases of impaired vision as contrasted with actual blindness the importance of strumous keratitis can hardly be overestimated. This disease is very common in Edinburgh and neighbourhood, and is much more frequently found amongst the poorer classes. The children affected are usually between two and twelve years old, some of the worst cases being in children of three or four years. Recurrences of the inflammation are very common. Sight is rarely completely destroyed, only about 4 per cent. of blindness in children being due to this cause. Strumous keratitis is, however, very important, owing to its frequency and the large numbers of cases of irremediable defective vision produced. The corneal opacities tend to diminish as time goes on, but seldom clear up entirely.

Lastly, with regard to refractive errors, myopia, or short sight, gives rise to a considerable number of cases of very defective vision in children. We need only consider that form of myopia which exists in high degree in quite young children and produces bad vision not remediable to any great extent by glasses. Its cause is not always apparent; in some cases heredity is concerned; it is obviously not originally produced by reading or use of the eyes for close work, though these factors may have a secondary aggravating influence.

The attitude of the public towards the question of blindness and defective sight in children is mainly sentimental. Once actual blindness has occurred sympathy is aroused and the afflicted child is educated and provided for, and will be made reasonably comfortable for the remainder of its life. It seems hardly to be realised that from a purely economic point of view, to say nothing

of the other aspects of the question, it is enormously more profitable to spend money on keeping down the population of blind asylums than on making life comfortable and easy for the inmates. While the collective conscience urges, and rightly, the fullest amelioration of the condition of the blind, it tolerates too easily the annual increment of blind or partly-blind children. The reason for this apparent apathy can only be ignorance of the real cause. It should be remembered also that the education of a blind child has been estimated to cost seven times as much as that of a normal sighted one, while the estimated earnings of a blind individual are only half those of a seeing person. It must be obvious that in wages and in other ways the nation loses very large sums annually, most of which might be saved by a larger expenditure on preventive measures.

Prevention and treatment constitute the practical aspect of the subject, and the former is of course by far the more important method. In application it will be found to be closely bound up with legislative, social, and economic questions. The great importance of venereal disease has already been pointed out.

Ophthalmia neonatorum is now on the list of infectious diseases compulsorily notifiable in Edinburgh under a penalty of forty shillings, but as yet notification is not followed by a bacteriological examination or removal to a special place for treatment. The chief object of notification in this disease must be to obtain control over the cases and ensure expert treatment in proper surroundings from the beginning.

Legislation to ensure the use of a prophylactic solution at birth, or at least to provide for the free issue of prophylactic outfits to doctors and midwives, as in some parts of the United States of America, is worthy of consideration. In some of these States the penalty for failure immediately to notify amounts to a fine of 200 dollars or six months' imprisonment or both. In Leith notification is followed by bacteriological examination. Uniformity of procedure seems most desirable, and we emphatically agree with the opinion of the Medical Officer of Health for Edinburgh that notification should be a national and not a local measure.

Methods of prevention of interstitial keratitis and the other ocular manifestations of hereditary syphilis will, it is to be hoped, be dealt with by the legislation at present in contemplation in connection with venereal diseases. It is well recognised that interstitial keratitis is much less common among the children of the better class, and we attribute this mainly to the more thorough

treatment of syphilis both in the parents and in the children. The prevention of strumous keratitis depends largely on improvement in housing and domestic hygiene, especially with regard to more rational and healthy feeding. A pure milk supply is of the greatest importance, in view of the undoubted, though obscure relationship between tuberculosis and strumous keratitis. It is unnecessary to dwell upon these matters, which are now constantly engaging the attention of the proper authorities.

THERAPEUTICS.—Here, in the first instance, the same principles apply as in connection with prevention. Legislative power is required to enforce, if necessary, the institution and carrying out of proper treatment in ophthalmia neonatorum or any other eye disease in which the absence of such treatment is likely to cause the patient at a later period to become an expense to the community. Parents should not be allowed, either wilfully or through negligence, to add to the quota of the blind. The influence of social amelioration upon therapeutics is admittedly far-reaching, as drugs and local applications to the eyes cannot be expected to yield good results *per se* in the presence of an adverse environment.

Let us now consider the scope for improvement in Edinburgh.

1. *Ophthalmia Neonatorum.*—Every case should be bacteriologically examined on notification. Those found to be gonococcal should be seen by an ophthalmic surgeon, who should decide whether or not the case is to be treated in hospital. At the present time there is no provision whatever in Edinburgh for the in-patient treatment of these cases. Three or four beds would suffice for the needs of Edinburgh, Leith, and district, either in one ward or, perhaps preferably, in single rooms in one of the present hospitals. The mothers would, whenever possible, accompany the infants. These beds should be under the charge of an ophthalmic surgeon and a specially trained nurse, and might be occupied by adults with gonococcal conjunctivitis or certain septic eye conditions if there were at any time a shortage of cases of ophthalmia neonatorum. A few beds of this kind would be of the greatest use also in regard to teaching and research. Clinical instruction in this important subject might thus be extended not only to students of medicine but also to others who are interested in child welfare.

2. *Strumous Keratitis.*—The great need here is for in-patient accommodation. There are at the present time in Edinburgh only eight cots specially set apart as children's eye beds, though a few more can be so used if required. About eight or ten beds for

boys and the same number for girls would suffice for the needs of the district. The children ought not to be in the same wards as adults, and it would be necessary to have a children's eye-clinic with airy, sunny wards and suitable playrooms. Convalescent homes are of great value in helping to prevent relapses, but the children should not be sent there until the active inflammation has subsided.

3. The other eye conditions are already for the most part sufficiently provided for. A special school, apart from the school for "defectives," is, however, required for children who, while not blind, have such poor vision that they cannot be taught in classes together with normally sighted children.

No child welfare scheme for Edinburgh can be considered adequate which relies upon the present facilities for the in-patient treatment of children with eye diseases.

Lastly, we should urge the necessity of a publicity campaign somewhat on the lines of that conducted by the "National Committee for the Prevention of Blindness" in the United States. We feel certain that the apparent public apathy which exists towards the question is entirely due to ignorance of the true causes and of the preventability of most cases of blindness and defective sight in children.

There is a very extensive literature on the subject, and for further information reference may be made to the following:—

Report to the Local Government Board for Scotland on the Incidence of Ophthalmia Neonatorum in Scotland. London: H.M. Stationery Office. 1912.

Royal Commission on Venereal Diseases: Final Report of the Commission. 1916.

Annual Reports of the National Committee for the Prevention of Blindness. New York: 130 East Twenty-second Street.

XIV.—DISEASES OF THE EAR, NOSE, AND THROAT IN RELATION TO CHILD WELFARE.

By J. S. FRASER, F.R.C.S.

DISEASES of the ear, nose, and throat have a very intimate relation to child welfare. Affections of the nose and throat may cause obstruction to breathing through the proper channels, and thus interfere with suckling in infants, and retard the bodily and even the mental development of older children. Diseases of the ear not only give rise to deafness, and so interfere with education, but not infrequently endanger the child's life.

DISEASES OF THE NOSE AND THROAT.

Nasal obstruction and consequent mouth breathing are such obvious abnormalities that the attention of the mother is soon called to them. The general public is much better informed on the question of nasal obstruction than on that of ear disease. It may even be stated that it is sometimes too well informed. Nowadays it is by no means uncommon for parents to come to a special department demanding that their children should be operated on for "tonsils and adenoids" when this operation is not really required. All cases of nasal obstruction in infants and children are not due to adenoids. Hypertrophic nasal catarrh is very common among the children of the poor. Deviations of the nasal septum and certain rare conditions such as polypi, foreign bodies, and tumours may also give rise to nasal obstruction. The nasal catarrh of congenital syphilis (snuffles) must not be forgotten.

Adenoids.—A certain amount of adenoid postnasal growth may be regarded as normal, and does not call for treatment. It is only when symptoms arise such as nasal obstruction, mouth breathing, deafness, disturbed sleep, mental dulness, faulty speech, etc., that the case calls for investigation. Congenital enlargement of the naso-pharyngeal tonsil is occasionally met with, but in most instances the hypertrophy follows severe or repeated attacks of nasal catarrh. In other words, "adenoids" must be regarded as the enlargement of a lymph gland following inflammation of the neighbouring nasal mucous membrane.

Statistics as to the frequency of adenoids in children of school age vary very considerably. Thus the chief medical officer of the Board of Education in his annual report for 1915 states that the percentage of children with adenoids was only 3·7, and with marked adenoids only 1·34. In the large towns the percentage was 5·8. On the other hand, some observers have recorded percentages varying from 12 to 60. During the last nine years 9000 cases of enlarged tonsils and adenoids have been operated on in Dr. Logan Turner's department in the Royal Infirmary. The great majority of these cases occurred in children of from three to fourteen years. A large number of other cases have also been operated upon in the other special departments and hospitals.

Treatment.—(a) *Conservative.*—The chief medical officer of the Board of Education states that conservative treatment, *e.g.* fresh air, breathing exercises, tonics, etc., cannot take the place of operation, though these measures are desirable in the after-treatment when the growths have been removed.

(b) *Operative.*—There seems to be no reason why operations should not—at least in large towns—be carried out at school clinics or at child dispensaries, provided that specialists are appointed and that suitable accommodation and instruments are provided. At the present time, however, no specialist is attached to the school clinics, for the authorities, while making some provision for the treatment of diseases of the eye, skin, and teeth have entirely omitted to deal with affections of the ear, nose, and throat—at least in Edinburgh.

The after-treatment of these cases is of great importance. It would often be an advantage to the child if it could be sent away to a suitable convalescent home for a period after operation. Further, it is important that cases should be followed up by health visitors, visiting nurses, and teachers. Hospitals should therefore notify the child welfare and school authorities that an operation has been performed. It is probable that, if cases were followed up in this way, a large amount of chronic progressive deafness would be avoided.

The remaining affections of the nose and pharynx in infants and school children are much less frequent. Mrs. Leslie McKenzie has already remarked on the beneficial effect of fresh air and good feeding in cases of chronic nasal catarrh—so common amongst the children of the poorest class. Attention may also be called to the subject of purulent rhinitis which not infrequently follows measles and scarlet fever, and, if not cured, may result in an exceedingly

objectionable condition, namely, ozæna. If cases of purulent rhinitis were treated in the early stages by suitable applications and also by vaccines, it is probable that the amount of ozæna would be greatly diminished.

Larynx.—Affections of the larynx are comparatively rare in infants and young children. Diphtheria has already been dealt with by Dr. C. B. Ker. Such conditions as acute laryngitis (non-diphtheritic croup), papilloma, congenital laryngeal stridor, laryngismus stridulus, foreign bodies in the larynx and lower air passages, etc., are so infrequent that they do not come within the scope of this paper. Further, the symptoms of these affections are so marked that the conditions are not likely to be overlooked except in the case of foreign bodies in the bronchi.

DISEASES OF THE EAR.

Affections of the ear may be considered from two standpoints: I. Danger to life, and II. Education.

I. *Danger to Life*.—It is probable that from a half to one per cent. of all deaths—at least in hospital practice—are due to the results of middle-ear suppuration. German authorities give us a percentage of 0·6. Of 800 deaths at the Royal Infirmary each year, from 5 to 18 are due to the intracranial complications of middle-ear suppuration. It is true that most of these deaths occur in adults, but *the ear disease originated in infancy or childhood* in the great majority of cases. In this connection measles and scarlet fever deserve special mention. Goodall states that otitis media occurs in 12 per cent. of all cases of scarlet fever, and that 4·5 per cent. of the cases of scarlatinal otitis suffer from mastoiditis *during their stay in hospital*. Goodall cannot and does not state, however, how many of the children who leave the hospital with running ears suffer from chronic purulent otitis media later in life, nor does he mention how many of them develop mastoiditis or intracranial complications. The medical officers of fever hospitals may say that a comparatively small number of their fever cases are dismissed with “running ears,” but it is necessary to know on whose authority this statement is based. It is not sufficient to accept the word of the nurse, or even of the resident house physician in a fever hospital, that the aural discharge has ceased. Only the opinion of one accustomed to the examination of the ear can be accepted.

In measles otitis media occurs in about 10 per cent. of the

cases, in whooping-cough in 5 per cent., and in typhoid in 2·6 per cent. (Goodall). In many of the cases the otitis does not go on to perforation of the drumhead and discharge from the ear. Many of these seemingly mild cases, however, do not entirely clear up, and unless complete recovery occurs the attack of otitis may be followed by a chronic adhesive process in the middle ear or by otosclerosis.

With the help of Drs. Ewing and Webber I have gone over the cases of chronic middle-ear suppuration which have come to Dr. Logan Turner's department during the years 1907-1914 inclusive. (Cases of acute suppurative otitis media were not investigated, because we seldom see acute cases which arise from infectious fevers, so that statistics compiled from our records of acute purulent otitis media would give an entirely false impression.) We have investigated the case records of 3084 patients suffering from chronic middle-ear suppuration. In 2025 of these cases the cause of the chronic discharge was not known to the patient or was not stated in the report. In the remaining 1059 cases the cause of the chronic otorrhœa was given as follows:—Measles in 392, scarlet fever in 267, diphtheria in 17, whooping-cough in 10, and typhoid fever in 11. All the other stated causes of the chronic middle-ear inflammation have been placed together, *e.g.* teething, "colds," influenza, blows on the ear, bathing in the sea or in swimming baths. The number of cases falling under these headings only amounts to 362, so that it will be seen that they do not equal the measles cases (392). Roughly, one may say that more than one-third of the cases are due to measles, less than one-third are due to scarlatina and other infectious fever, while the remaining third are due to other causes.

In many cases of chronic middle-ear suppuration we meet with complications in the mastoid, labyrinth, brain membranes, in the large venous blood sinus which lies behind the ear, or in the brain itself. Dr. Garretson and I have gone over all the cases of chronic middle-ear suppuration on which I have operated at the Royal Infirmary during the last ten years. These cases number 327. In 278 of these mastoiditis alone was present, and the radical mastoid (or modified radical) operation was performed. In 184 out of these 278 cases we got no information regarding the causation of the chronic middle-ear suppuration. With regard to the remaining 94 cases the cause of the chronic purulent otitis media was stated to be measles in 35, scarlet fever in 19, and diphtheria in 5, while in the remaining 35 cases the causation was

variously stated as teething, cold, accident, etc. All of these 278 cases recovered.

In the remaining 49 cases a further complication was present, *e.g.* extra-dural abscess, labyrinthitis, sinus thrombosis, brain abscess, or meningitis. The cause of the chronic otorrhœa which gave rise to these conditions was ascertained in only 19 of the 49 cases as follows:—Measles, 12; scarlet fever, 5; diphtheria, 2. Of the 49 complicated cases, 31 recovered and 18 *died*.

Nurses and practitioners should be better acquainted with the sign of danger in middle-ear suppuration—pain in the ear, swelling behind the ear, headache, fever, rapid pulse, giddiness, vomiting, facial paralysis, cold feelings or rigors, retraction of the head, delirium, etc. When any of these symptoms are present, no time should be lost. Such cases should be sent *at once* to hospital. The practitioner has now learnt to send in his cases of appendicitis or of ruptured gastric or duodenal ulcer for immediate operation, but he still keeps cases of intracranial complication due to ear disease under treatment at home when they should be in hospital.

Neglect of Middle-Ear Suppuration.—Up to the present time a running ear has been looked upon as a sort of necessary evil. The child's mother has been told that the trouble will probably get better when the child reaches the age of seven years, or, if this prediction proves untrue, of fourteen years. Meanwhile she has been instructed to leave it alone or to drop a little hot oil into the external meatus. In this connection fever hospitals all over the country have been greatly to blame. Far too many cases have been turned out of the hospitals suffering from purulent otitis media and handed over to the mother with a recommendation to "get the ear syringed." It is quite useless to tell a mother, who may perhaps have four or five other children to look after, to get peroxide or hydrogen drops, lysol, or boric lotion, and an *efficient* ear syringe (not a glass or rubber squirt), and to treat her child's ears twice daily with antiseptic precautions. The mother has not the time, skill, patience, and very often not even the money, to carry out these directions. To a great extent it may be said that chronic middle-ear suppuration is a "*dirt*" disease. It bulks far more largely in hospital than in private practice, even after all allowance has been made for the greater number of patients seen in the former. Ear syringing is not difficult, but it does require *some* skill. (We find that at the Royal Infirmary a nurse takes at least a fortnight to learn to do it properly.) The child's doctor is much too busy to carry out this treatment, and hospitals do not

possess the requisite staff. Further, the hospitals, at any rate in large towns, may be too far distant from the child's home or school. For these reasons treatment must be carried out at child dispensaries or school clinics scattered throughout the city. The syringing should be performed by trained nurses under the supervision of a junior specialist. Specialists should also be appointed to the fever hospitals.

Objection will at once be taken—on the score of expense—to the appointment of so many specialists. The important question, however, is, Are these specialists required for the efficient treatment of ear disease? If they are, expense should not be allowed to stand in the way.

Aural Tuberculosis.—Tuberculous affections of the ear are divided into two groups: (a) *in infants and young children* and (b) *in adults* suffering from pulmonary tuberculosis. These latter cases are rare, and do not come within the scope of this paper.

(1) Here, in infants and young children, we have to deal with the same problem as confronts us in tuberculosis of bones and joints and in tuberculous cervical adenitis, including tuberculosis of the tonsil; *i.e.* it is largely a question of the milk supply. Dr. Turner has found that in children under the age of two years 27 per cent. of cases of suppurative otitis media are due to tuberculosis, while under one year 50 per cent. of the cases are tuberculous. On the other hand, if we take otitis media at all ages, only 3 per cent. are tubercular.

The prognosis in cases of tuberculous otitis media is very bad. The labyrinth is soon involved, and tuberculous meningitis may follow. With regard to treatment—prevention is at present the only thing worth considering. Operative treatment holds out practically no hope so long as the children have to be sent back to the slums from which so many of them come. Sanatorium treatment is urgently required in the after-treatment if operative measures are to have a chance of success.

II. *Educational Aspect of Ear Disease.*—Deafness, which results from ear disease, gravely interferes with the child's education. Later on it is the cause of marked loss of efficiency in the worker, and much reduces his earning capacity. There are comparatively few occupations suitable for a deaf individual unless he be extremely expert at lip reading.

Causes of Deafness.—Deafness may be congenital or acquired.

A. *Congenital Deafness.*—Apart from heredity and cousin marriages, the great majority of cases of congenital deafness are

due to congenital syphilis. The most severe cases of ear syphilis occur *in utero*, and very often the child is dead-born. Many cases of so-called "congenital" deaf-mutism are really due to syphilitic affections of the ear coming on before the child has learnt to speak. Syphilis ranks along with epidemic cerebro-spinal meningitis and suppurative otitis media as one of the most frequent causes of deaf-mutism. Yearsley gives a percentage of 3·4, Siebenmann of 5·6, Bock of 8·1, Urbantschitsch of 26, and Ker Love of 30, as representing the proportion of deaf-mutes suffering from congenital syphilis. The last two investigators have employed the Wassermann reaction.

The frequency of deafness among congenital syphilitics has been stated by some to be 30 per cent., by others to be as high as 60 per cent. In twenty-one syphilitic families Ker Love found that there had been altogether 172 pregnancies, of which 30 resulted in miscarriages or still-births. Of the 142 children born alive 45 had died, thus, with the miscarriages and still-births, giving a total of 75 deaths. (Among the 45 deaths which occurred after birth there were many cases of meningitis.) Of the 97 individuals living at the time of examination 31 were deaf and blind. Of the 66 living children who were neither deaf nor blind many had been born before the parents contracted syphilis.

Mauthner makes a remarkable statement that 1 per cent. of all men unfit for military service—active or auxiliary—are unfit because of a syphilitic ear affection.

Health visitors and nurses must be on the lookout for cases of congenital deafness. The fact that, according to the mother, the child can "hear" a door bang or a band passing in the street does not prove that it really hears. The child *feels* these things. It is important to notice if the child turns its head when an unseen person behind it blows a whistle, claps her hands, or calls the child by name. Attention should also be paid to the way in which the child walks. A broad-based, waddling gait is characteristic of a severe ear lesion.

This is not the place to enter into the question of the antenatal treatment of syphilis. It is sufficient to point out the hopelessness of treatment after the child has developed a syphilitic ear lesion.

B. *Acquired Deafness*.—In the great majority of cases of acquired deafness *middle-ear suppuration* will be found to be the cause. As long as children suffer from influenza, scarlet fever, measles, diphtheria, etc., some of them are sure to have severe

suppurative otitis media, and more or less deafness in consequence. "Colds" in the head, adenoids, and bathing—either in the sea or in swimming baths—may also be mentioned as causes of otitis media. The child's mother often states that a blow on the ear at school was the cause of the middle-ear suppuration; but in my experience this statement is seldom correct—as shown by the fact that the other ear exhibits the signs of a past middle-ear suppuration.

While we may not be able to do much to prevent the occurrence of acute middle-ear suppuration, we can, to a very large extent, *prevent this acute otitis from becoming chronic*. The principal causes of chronic purulent otitis media are as follows:—(a) Virulence of the original acute infection (this we cannot help); (b) poor general health; and (c) want of proper treatment. (b) and (c) can be remedied.

I must not here enter into details regarding the various methods of treatment by means of ear-drops, syringing, attention to the nose and throat, fresh air, tonics, vaccines, or small operations on the ear. I merely express the opinion that, if conservative measures fail to obtain a cure within six or eight weeks after the onset of acute purulent otitis media, the question of an external operation should be considered.

Education.—Many children in Board schools are blamed for inattention when they are really only suffering from deafness. They do not attend because they cannot hear. As Yearsley says, a child must be able to hear the whispered voice at from 6 to 8 feet if it is to be educated in an ordinary hearing school, because it must be able to hear what the teacher says when the latter has his back turned, while writing on the blackboard or while the child itself is looking at its book.

All children should be examined when they come to school as follows:—The child stands "sideways," with one ear directed towards the examiner. An assistant, nurse, or teacher closes the child's eyes to prevent lip-reading, and occludes the ear not under examination with his finger. The child's hearing is then tested by means of the forced whisper—a list of suitable words of two syllables which are well known to the child being used. The child is asked to repeat the words at once. Thereafter the other ear is tested in the same way. The children may then be classified as follows:—(1) *Normal hearing*, i.e. forced whisper heard at 20 yards or more. (2) *Slight deafness*—forced whisper at from 4 to 20 yards. These cases are due to obstruction of

the Eustachian tube associated with nasal catarrh or adenoids. (3) *Medium deafness*—forced whisper at from 2 to 4 yards. (4) *Marked deafness*—whisper at less than 2 yards. All cases, even of slight deafness, should be examined by an otologist, and, of course, treated. Cases of slight deafness should sit in the front seat in the ordinary hearing school and should receive special attention. Cases of medium deafness require special classes, which should be small. Cases of marked deafness should be taught by a teacher qualified as a teacher of the deaf (Yearsley).

It is found that many of the children at the bottom of the class are deaf. Further, the prolonged effort to hear is bad for the child. In Germany and Scandinavia they find that from 25 to 50 per cent. of the children show more or less defective hearing. Frey in Vienna found 12 per cent. to be more or less deaf. Most of these cases had nasal or naso-pharyngeal affections. In London it was found that 12 per cent. of the children in South London were more or less deaf, while in East London the percentage was 30. It would thus appear that in the poorer districts the percentage is considerably higher than in the better parts. Dr. Cruickshank has already stated that in Scotland only 5 per cent. of school children are deaf. (The great variation in the statistics as to the percentage of deafness in school children is no doubt due to the different standards applied.) In East London Miss Ivens found middle-ear suppuration in 15 per cent. of the children who were mouth breathers and in only 3 per cent. of the other children.

Ker Love states that, in Glasgow, out of 120,000 school children there were 3000 cases of ear "disease." In Edinburgh, out of 40,000 school children 600 cases of purulent otitis media in children of school age attended Dr. Logan Turner's department at the Royal Infirmary. Many children, of course, did not attend at all, while others went to other hospitals or departments. It would thus appear that from 1 to 2 per cent. of children attending the Board schools suffer from purulent otitis media.

Deaf-Mutism.—In practically all cases the mutism or dumbness is due to the deafness. The child does not speak because it cannot hear speech. A young child, which has already learned to speak, will rapidly lose its speech if it becomes totally deaf. In Scotland the proportion of deaf-mutes is 5·7 per 10,000. In Switzerland it is 24·5, due to endemic cretinism and too close intermarriage. Deaf-mutism, like other forms of ear disease, is most common in the poorest districts. Half the cases are said to be congenital and

half acquired. Many of the so-called "congenital" cases are, however, really due to syphilis. Of the acquired cases 50 per cent. are stated to be due to inflammation of the brain and its coverings—31 per cent. being caused by epidemic cerebro-spinal meningitis. The remaining 50 per cent. of acquired cases are due to otitis media and labyrinthitis and to "late" syphilitic affections of the ear.

Education.—All deaf-mutes should be sent at the age of three or four years to a preliminary school for a period of two years, and should there have the chance of education by the oral method. At the end of this period the children can be classified into—(1) *The semi-deaf and semi-mute*, who should be trained by the oral method entirely. These cases amount to 30 per cent. of deaf-mutes. (2) Those born quite deaf, and those who have become deaf so early that speech will not develop without special training. These compose 70 per cent. of deaf-mutes. This second group is further subdivided according to the mental capacity of the child (Ker Love); but it is needless to enter further into the many questions connected with the education of deaf-mutes. It is sufficient to say that in this country we are a long way behind America in this respect.

RECOMMENDATIONS.

1. The treatment of the syphilitic mother before the birth of her child.

2. Health visitors and nurses should be instructed in diseases of the ear, nose, and throat.

3. Children who show signs of nasal obstruction or of deafness or "running ears" should be taken to child dispensaries, where they should be examined by the specialist attached to the dispensary. Treatment of slight cases should be carried out at the dispensary by the specialist or by skilled nurses under his supervision. More severe cases should be sent to special hospitals or to the Ear, Nose, and Throat Departments of the Royal Infirmary or the Royal Hospital for Sick Children.

4. On coming to school all children should be examined as regards the condition of the ear, nose, and throat. The hearing of both ears should be tested. All cases showing any abnormality should be passed on for examination by the specialist attached to the school clinics. Teachers should call the attention of the school medical officer to any child whom they suspect to be suffering from an affection of the ear, nose, and throat. For this purpose

the teachers should be instructed regarding these diseases. Treatment should be carried out either at the school clinics or at the hospitals, as indicated under (3).

5. Specialists should be appointed to fever hospitals to look after cases of disease of the ear, nose, and throat occurring in the course of the infectious fevers. Children suffering from deafness and otorrhoea as the result of these diseases should not be sent home until they have thoroughly recovered.

6. With regard to tubercular disease of the ear in children, we must aim at prevention by dealing with the milk supply. When the disease has occurred operation holds out little hope.

7. Convalescent homes should receive certain cases of chronic nasal catarrh, certain cases after operation for enlarged tonsils and adenoids, cases of subacute middle-ear suppuration, in which fresh air, etc., might obviate the necessity for operation. Certain cases after operation on the ear—especially those for tubercular disease—should also be admitted to convalescent homes.

8. Special classes or schools should be instituted for children who are hard of hearing, but are not sufficiently deaf to require admission to deaf-mute schools.

9. Deaf-mutes should enter school at the age of three or four years, and not at seven years, as at present, and should remain until they have learnt a trade.

10. There is room for the extension of the excellent lip-reading classes at present provided by the educational authorities in Edinburgh.

XV.—CHILD WELFARE AND THE PREVENTION OF DENTAL DISEASE.

By J. H. GIBBS, F.R.C.S.

DENTAL caries is the commonest disease to which mankind is liable, but the incidence varies much with time and place. Thus large numbers of statistics show that in modern civilised communities 98 per cent. of people have caries, whilst the percentage in uncivilised races, living under natural conditions, varies from 1 per cent. to 20 per cent. As regards the number of teeth affected, the percentage is from 15 to 52 in civilised as against 2 to 7 per cent. in native races. Caries is essentially a disease of childhood and adolescence, and the percentage rises rapidly with each succeeding year, and varies somewhat in different countries. Thus in this country, at the age of six, about 84 per cent. of children have carious teeth, and at the age of fourteen 98 per cent. to 100 per cent. have carious teeth, and at both ages the number of decayed teeth in each mouth is large.

In this respect it is interesting to note that the Maoris of New Zealand are the most immune to caries, and amongst those living on a native diet caries occurred in at most 1 per cent. of the people. After nearly seventy years of more or less civilisation caries occurs in 95 per cent. of Maori children living under European conditions—the incidence thus rapidly becoming equal to that of races of long civilisation.

Fortunately for us the bones, and still more so the teeth, are very indestructible, so that we are able to compare these parts of the anatomy of our remote ancestors with those of ourselves. We find that dental caries and pyorrhœa alveolaris were non-existent, or at least rare. Even if we go back only, say, three hundred years in this country, dental diseases were very uncommon, and we know quite well that they have become alarmingly prevalent during the past fifty years—so much so that they are accepted as a matter of course, and a good set of teeth is looked upon as something to marvel about.

That dental caries and pyorrhœa alveolaris are primarily dependent on diet is beyond dispute, and the remedy I shall suggest is very largely based upon the researches and deductions

of Dr. Sim Wallace, who has carefully investigated the relationship between dental disease and modern diet. His conclusions have been confirmed by Prof. Pickerill, who has approached the subject from the experimental and comparative side. Of great interest to us who are seeking a solution of the problem of dental caries in the children of the masses, is the fact that a sufficiently large number of children have been brought up on the lines laid down by Sim Wallace to prove that, even under modern civilised conditions, dental caries can easily be entirely or almost entirely prevented.

Dental treatment may be remedial or preventive. So far only remedial treatment has been tried, and then only on a very small scale. As is so often the case, just enough has been done to lull the public conscience into a belief that the evil is being dealt with. Those of us who have studied the matter, even very superficially, know that the good that has been done in dental clinics to the average school child is so infinitesimal compared with what is required that it is doubtful whether the time, trouble, and expense involved are worth it at all. There are four part-time dentists doing the work of the Edinburgh School Board; and when I assure you that the barest necessities of treatment could not be overtaken by fifty full-time dentists working school holidays as well as school hours, you may understand how futile remedial dental treatment is.

On the other hand, preventive treatment has the advantage of being rational, effective, perfectly simple, conducive to good general health, and it costs nothing. Briefly stated, the cause of the prevalence of dental caries in modern civilised communities is the enormous increase in the consumption of food of a soft, sticky, sweet nature, requiring little or no mastication before it can be swallowed.

Leaving out of account antenatal welfare, the feeding of the newly born infant is of great importance from the standpoint of the prevention of dental disease. The child should be breast fed, not only for three months—which seems to satisfy many medical men—but for the full period of seven or eight months until teething begins. The breast-fed child has larger alveolar arches, with more regular teeth upon which sweet sticky food is less likely to lodge. Again, the teeth of hand-fed children are not nearly so well calcified as those of breast-fed children, and they are far more prone to caries. So marked is the difference in the structure of the teeth in the two cases that it is possible to say,

almost with certainty, from a mere examination of the teeth, whether the individual has been breast fed or hand fed. Parenthetically, I would like to emphasise the fact that there is no evidence, that will bear scientific investigation, of any deterioration or degeneration of the teeth in modern civilised communities; hence the cause of the great increase in dental disease must be sought for, not in the teeth themselves, but in the malign influences to which they are subjected.

The next period is that of weaning; and at no other time are such gross and obvious dietetic errors perpetrated. This period is characterised, firstly, by a deterioration in the quantity and quality of the mother's milk, so that the child no longer receives sufficient nourishment; and, secondly, by the commencement of the eruption of the teeth. Now, surely it is obvious that the diet of the child should undergo a complete change, and that, if milk were still a suitable diet, the average mother would continue to secrete it. Surely, too, if a milk diet were still appropriate for the child, he would not have the entrance to his alimentary tract armed with rows of teeth which are amongst the hardest substances in nature, and which are obviously there to assist him in getting his nourishment from hard and tough material. Yet what instruction does the medical man give to the mother? In general terms, at weaning he prescribes a diet almost wholly of milk, to which he adds equally ridiculous foodstuffs in the shape of oat flour, bread soaked in the milk, porridge deluged with milk, milk puddings, milk and patent foods, all liberally sweetened, and gravy and mashed potatoes—truly an extraordinary diet for a child rapidly cutting its teeth. It has already been said at these meetings that the commonest ailment of infants is indigestion. Considering that the doctor has given the mother detailed instructions for producing dyspepsia and ill-health in her child, which may handicap him throughout life, we should marvel, not that indigestion is so rife, but that the child is alive at all. There is no doubt that the anatomy and physiology of our gastro-intestinal tract is the same to-day as they were hundreds of thousands of years ago, and, fortunately or unfortunately, they will not tolerate the civilised improvements in the way of diet that modern man insists upon imposing on them.

How, then, should an infant be weaned rationally with the knowledge we have of anatomy, physiology, and development, and of the methods of primitive races, ancient and modern? The teeth that appear first are the sharp, chisel-like incisors, and

they are suited for two purposes—tearing meat off bones and piercing ripe fruit. Nothing could be less adapted than these for dealing with the bulk of carbohydrate food as it occurs in its natural state, as it is very hard and requires excessive mastication. In spite of this clear indication of what should not be given, cereals, largely composed of carbohydrates, are artificially ground to an impalpable powder, made into a sloppy mess with milk, and presented to the child. The infant takes it in preference to starvation, with the result that indigestion, flatulence, colic, diarrhoea, bad temper, and crying are quickly induced; and as he is now cutting his teeth, of course all these evils are attributed to that and not to the obvious cause. The teething infant begins to bite anything hard, such as a finger, key, watch or bone ring, and he is instinctively trying to get nourishment from a natural source—some hard substance. In a primitive state of society the child, as the mother's milk fails, would have his food supplemented by meat and fruit. Thus, even before the teeth have appeared, let the infant have bones without jagged ends to exercise his gums upon, such as rabbit or chicken or chop bones, on which some meat has been left. The child should get sips of water to drink, and the milk, which will for some months make up a large part of his food, should, I think, be sterilised. It is sometimes more palatable if made into an unsweetened custard with an egg, but it should be thin enough for the child to recognise that it is a fluid and drink it. The milk should on no account be given with carbohydrates ground into flour. The infant should also have fresh fruit juice, such as that of an orange, but let him have the enjoyment of squeezing it out for himself by the mother holding a section of ripe orange (from which the pips have been removed) by one end and letting the child suck and gnaw the contents out from the other. At this age, a well-toasted crust, thickly spread with butter, margarine, or dripping should be added to the dietary. The two great pitfalls to avoid are the sweetening of the food and the giving of pap. Regarding the former there is an almost ineradicable belief that the craving for sugar is a natural instinct in a child. Most people who use the phrase so glibly do not know what an instinct is; but if an infant really has such an instinct one cannot but feel one's heart swell with pity for the countless millions of babes, right down the centuries, who have perforce never been able to indulge it. Sugar as we know it in the unnatural, concentrated, sweet, sticky form, especially as made into jam, sweets, chocolates, cakes,

etc., is quite a modern product. Dr. Woods Hutchinson, of New York, speaking at the International Congress of Medicine, London, 1913, said: "The demand for sugar showed that the child's economy demanded sugar, and to deny it would be to starve its system. You might improve its teeth, but ruin its body. It was surely better to have a healthy child with inferior teeth than a semi-starved creature with very beautiful teeth." To come nearer home, Dr. W. Leslie Mackenzie, in his report on the medical inspection of school children in Scotland in 1913, says: "The common suggestion that children consume too many 'sweets' is peculiarly inept, even if it be granted that sugar promotes decay, for sugar is as necessary an article of food as meat or bread—a physiological fact that might be inferred from the very strength of the appetite for sugar." Such statements as these surely indicate some misunderstanding of the subject of dietetics, and are good examples of the type of argument that is always brought to bear whenever any reform is advocated. It is contrary to all our knowledge, biological and clinical, to argue that a diet that is bad for the teeth is good for the rest of the alimentary canal, and therefore for the whole system, or *vice versa*; and yet this is a statement made every day alike by lay people and by physicians.

It is an interesting fact that sugar, with one exception (honey), always occurs in nature mixed with a very large proportion of detergent fibrous tissue and of acid salts, and it is in this harmless state only that the child should get his sugar—namely, as ripe, uncooked fruit. If the sugar allowed the child were extracted by him from, say, sugar cane, he would have to perform a lot of work which would develop his jaws and nasal passages to get a very small quantity, and therefore he could not get an excess of it, and what he did get would be in a form that is not only absolutely harmless, but beneficial. What I am condemning is the giving of sugar in an unnatural, too concentrated form, such as jam, sweets, chocolates, cakes, etc., and especially at wrong times. The craving for sugar in an unnatural form is easily acquired, and, owing to ignorance and indulgence and the advocacy of the doctor, the child soon gets an injurious amount. Another important fact is that a child who gets sugar will not eat fat, and the more fat he eats the better. Physiologically, sugar and starch are much the same, and considering that the average child, and particularly the poor child, is habitually getting far more than enough starchy food (such as bread and potatoes, and the inevitable semolina), it is surely

ridiculous to argue that he needs sugar as well, and especially sugar in the unnatural, catarrh-producing form in which it is almost invariably given. The addition of sugar, which is a pure carbohydrate, to a sufficient diet of bread and potatoes is a case of carting coals to Newcastle! What the average child is suffering from is carbohydrate poisoning and protein and fat starvation; consequently, again contrary to usual belief and custom, let the child have as much meat as he will eat, and see that half of it is visible fat.

At about fifteen months four milling teeth or molars appear, and the child's digestive juices become capable of dealing with starch, and so starchy food may be added to the dietary. The form in which the starch is added is all-important. Surely if the child has miniature flour mills they should be allowed to fulfil their function; but how can this be done when the starch is given in a finely divided state and soaked in milk?

We have already seen that the eruption of the teeth is accompanied by a natural desire to use them; but the pleasure of mastication can be very readily destroyed by giving a diet that makes this impossible. The pap-fed child quickly becomes a bolter, and in a few months' time will grumble if he has to eat a crust. It is highly important, then, that all starchy food should be given in as dry, coarse, and hard a form as possible, and that the child should on no account be allowed to drink anything until after he has finished eating. The rule is that, in the early years of life, food should be either completely solid or completely liquid. Later on the exigencies of modern life make it necessary that the child should take potatoes and milk puddings, but the habit of mastication should be kept up by giving him well-baked oatcakes and Swedish bread instead of porridge, and by insisting that all the bread is made into hard dry toast or rusks.

When one comes to compare the diet of civilised races with that of native races, one finds an essential difference in that the diet of native races is universally either highly "acid" from acid salts, or highly pungent from spices, essential oils, etc., and in this respect the diet of native races is far more correct than our own. These acid and pungent substances give a relish to the food and call forth an abundance of digestive juices. Incidentally they call forth an abundance of saliva of high alkalinity and amylolytic power, and the almost complete immunity of native races to dental caries is due to the copious secretion of, and bathing of the teeth in, highly alkaline saliva, which is the best mouth wash we can

use. It is scarcely necessary to point out how far from this ideal is the ordinary child's diet of gravy and mashed potatoes, milk puddings, and bread soaked in milk. Children from fifteen to eighteen months onwards should have sufficient salt, vinegar, mint sauce or other sauce or pickles to flavour their meat or gravy, and in the summer months should have abundance of lettuce, etc., in the form of salad, with a mild dressing. In the same way, if they have a milk pudding, it should be well flavoured with a refreshing stimulant, such as lemon juice. To those who have not witnessed it, it is wonderful what a difference it makes to the child's appetite, whether the food is of the flat, flavourless, insipid type that most children get, or is made tasty and appetising by the addition of a condiment. It is a fact little realised that the chief reason why children take so much sugar with their food is simply to give it a flavour, because as served it is usually quite tasteless, and sugar is the only means in reach of the child to make it eatable.

From the standpoint of the prevention of dental caries it is all-important that the mouth should be left in a naturally hygienic state at the end of each meal, and particularly at the end of the last meal of the day. Thus a meal should never end with such easily lodgeable and fermentable substances as biscuit, jam, or cake. These should be scrubbed off with good crisp toast and butter, or rusk, and, if possible, followed by fresh fruit. An apple is probably the best, because of its acidity and scouring action when thoroughly masticated, but any fresh fruit in season will serve. In cases where the expense of fruit makes its use impossible a saturated solution of acid potassium tartrate, to rinse out the mouth with thoroughly after the meal, is a very good substitute.

The prevalent use of sweets and chocolate is a fruitful source of dental caries, of dyspepsia, pain, and general ill-health. They should never be given to a child and then he will not want them. They have never yet done a child any good, and there are very few children to whom they have not been a source of much misery. From a dental point of view one sweet or one chocolate taken at the end of a meal, or between meals, day after day, is almost as bad as a hundred, because it leaves just as much to ferment on the teeth as a large number. If a sweet or a chocolate is foolishly going to be given to a child it should be during a meal, and followed by fresh fruit. There is a widespread belief that the use of a toothbrush will prevent caries, and that if the teeth are carefully brushed when the child goes to bed no harm will

result from the sweet, chocolate or biscuit, so commonly given to him before retiring. Surely it is only necessary to appeal to the experience of each one of us to show how utterly fallacious such a belief is. To prevent dental caries effectively by artificial means, such as the toothbrush and silk thread, requires such varied and difficult movements that very few adults, and certainly no children, would ever give the time or have the patience to carry them out. Consequently, in seeking to prevent dental disease, one must discredit the belief in the efficacy of the toothbrush as commonly used, and substitute for it a knowledge of the complete efficacy of leaving the mouth at the end of each meal, and especially after the last meal of the day, in a natural, physiological, hygienic state.

One word as to the necessity for vigorous mastication, which must be kept up throughout life, if *pyorrhœa alveolaris*, which causes the loss of such enormous numbers of good teeth and leads to so much ill-health, is to be prevented. The cause is very frequently attributed to disordered metabolism, and especially to gout; but if that be so, nearly every individual over twenty years of age in all civilised and many native communities must suffer from gout, and so must practically all domesticated animals and those in zoological gardens, whilst in the feral state it is unknown. Again, the fact that this disease can be absolutely cured in the early stages by putting the patient, man or animal, on to a diet requiring mastication, shows that it is of local origin. The commencement of it can frequently be seen in children at ten or twelve years of age, but they probably will not know that they have it until after the age of twenty, when bleeding gums, an unpleasant taste and smell, and perhaps tender teeth, call their attention to it. Efficient mastication keeps the teeth and mucous membrane of the mouth in a healthy condition, and in the young child it promotes the development of the jaws, so that the teeth have larger arches to erupt into, and thus overcrowding of the teeth, the chief predisposing cause of dental caries, is prevented. Again, there is a distinct tendency to inadequacy of the nasal passages at the present day, and although it is difficult to determine how much this is really due to want of mastication, there can be no doubt that, owing to the position of the attachment of some of the muscles of mastication, thorough mastication during the period of development would strongly tend to widen the posterior nasal openings by the pull on the parts and by the increased blood-supply. In this connection it should be noted

that all mouth breathers develop pyorrhœa alveolaris at an early age.

The prevention of dental caries, then, consists in omission from the ordinary diet rather than in additions to it. Prevention costs nothing, and is as applicable to the poorest as to the richest. Dental caries undoubtedly causes more acute suffering and misery to the community in the course of every year than any other disease, whilst the disfigurement that it causes is only too obvious. In loss of work it costs this country many millions of pounds annually, and yet it could be almost completely abolished simply by discarding a few recently introduced luxuries in the shape of sweets, and by so arranging our meals that none of them shall end with soft, sticky, sugary food.

XVI.—MEDICAL INSPECTION AND SUPERVISION OF SCHOOL CHILDREN IN EDINBURGH.

By J. HALLY MEIKLE, M.A., B.Sc., M.D., D.P.H.

UNDER Edinburgh School Board's scheme all school children are examined at three periods of their school life—(1) As entrants; (2) as leavers; (3) at nine years old. The various schools are visited at regular intervals during the session by the same doctors and nurses—the larger schools being visited every fortnight, smaller schools every three weeks. The inspection consists of an examination of the children as regards cleanliness, sufficiency of clothing and boots, general nutrition, mental capacity, and a more detailed examination as to the condition of teeth, nose, throat, ears, eyes, glands, skin, heart, lungs, bones, and joints. All defects found are noted and intimation sent to parents when necessary, advising them to get "medical advice." In cases where there is evidence of neglect, or in cases that need immediate attention, a visit is at once paid to the home by a school nurse. On a subsequent visit to the school the cases notified are re-examined, and further action taken if the defects have not been remedied or received attention. As regards the infants examined, many are found to start their school life handicapped by serious defects which could have been remedied if they had been under proper supervision and treatment in their pre-school years. In the examination of the leavers special attention is paid to the pupil's fitness for future occupations, and on the card which every pupil has in connection with the Juvenile Employment Bureau notes are made of defects which should be remedied before the pupil starts work, or which render him or her unfit for certain occupations. The school population is about 45,000, and about 11,000 routine pupils are examined every year.

In addition to these groups of pupils the school doctor at each visit to a school sees any special cases the headmaster may present. These are treated in much the same way as the routine cases—defects noted, intimation sent to parents, homes visited where necessary, and re-examination made on next visit to the school. These special cases average in a year over 11,000. In addition there is an examination at the school clinic one day per

week for certain special cases, so that, with re-examinations and all special cases included, about 20,000 examinations in addition to the 11,000 routine examinations are made each year.

The means adopted to provide treatment for the various defects and conditions found are best described under the following heads:—(1) Treatment of conditions due to neglect; (2) treatment provided at the school clinic; (3) treatment by means of special schools and classes.

1. *Treatment of Conditions Due to Neglect.*—Most of the uncleanness found among school children is due to neglect or carelessness. It was soon recognised that more was needed in order to secure a remedy than a mere intimation regarding the condition; and a special scheme was adopted by the School Board for dealing with these cases. Under this scheme child neglect was divided into seven groups—insufficient food, boots or clothing, neglect of medical treatment, vermin of head, vermin of body, and condition of dirt. The method of procedure is as follows:—A certificate of neglect is sent to the Board by the school doctor who examines the child, and then a statutory warning notice is sent to the parent by the Board; if there is no improvement on next examination a second certificate of neglect is sent and the parent summoned to appear before the Board, and the case then transmitted to the Procurator-Fiscal for prosecution, if necessary. Much good has resulted from the issue of these warning notices. In addition to the notices, the school nurses visit the homes in all cases and give full instructions how to remedy the neglect. The work of the school nurses is most valuable, and as they pay about 4000 visits per year to homes, much of the improvement secured in connection with these cases is due to them.

It was recognised, however, that all attempts to secure proper cleanliness in the children were useless unless the homes were dealt with; so the Board, by arrangement with the Town Council, have on their staff one of the sanitary inspectors. This inspector, on receipt of the certificates from the Board's medical officers, visits the homes, reports on the conditions found, and, through the Sanitary Department, carries out all necessary disinfection and cleansing. The following figures from the yearly report give an indication of the work done by the inspector:—1566 visits were paid to homes in connection with 629 notifications dealing with 894 children. The number of persons dealt with at the cleansing station was 274. The number of beddings disinfected was 133.

The number of houses found dirty was 283; these were put into a more satisfactory condition. There were 26 cases of overcrowding which were remedied.

As regards insufficient food, boots, or clothing, warning notices are sent from schools regarding these conditions, and when application is made by parents, either for food or clothing, a full inquiry is made into the case by a committee which decides whether the case is one of poverty and deserving relief, or one of neglect to be dealt with as described above.

The requirements as regards clothing and boots for necessitous children are met with by the operations of the Police-Aided Clothing Scheme and other charitable agencies. During last session 1635 children were supplied with boots and clothing according to their needs.

Under the Board's Feeding Scheme provision is made for supplying free dinners to necessitous children. The number of pupils who received free dinners during the whole or part of last year was 648.

2. *Treatment Provided at the School Clinic.*—This consists of—(1) Treatment of defective vision by a part-time oculist; (2) treatment of defective teeth by four part-time dentists; and (3) treatment of minor defects by the school nurses under the supervision of the medical staff. Over 10,000 attendances are made at the clinic each year. In connection with the oculist's work arrangements are made by the Board for the provision of spectacles, and over 90 per cent. of the total cost of spectacles supplied through the Board is recovered from the parents. Dental treatment is confined to pupils six years and nine years old. Of the pupils examined who require dental treatment, about 45 per cent. accept the services of the school clinic. The treatment of minor ailments, carried out by the nurses, consists chiefly in treating cases of otorrhœa, external eye diseases, and skin diseases, and about 5500 attendances were made in connection with this work.

3. *Treatment by Means of Special Schools and Classes.*—Provision is made in Edinburgh at special schools or classes for the following groups of children:—(1) Mentally defectives; (2) physically defectives; (3) children suffering from certain skin diseases.

There are now on the rolls of the mentally defective classes 280 pupils. The physically defectives include cripples and delicate children, and number 220. Included in this group are

the delicate and convalescent children who are sent to the country at Humble village for two or three months during the session. In the special school for children suffering from skin diseases there are 160 pupils. Ringworm and favus are the diseases treated there. The School Board has an arrangement with the Royal Infirmary whereby X-ray treatment and supervision by the Skin Department is carried out, the pupils receiving their education at the school and also, through the school nurses, the treatment prescribed.

The School Board is also responsible for the education of blind, deaf and dumb, and epileptic children; but these cases are sent to special institutions, and 74 pupils are at present being maintained by the Board in various institutions.

While much is done by the means described above to secure treatment and supervision where necessary, it must be remembered that very many other children, as the result of medical inspection, receive treatment either through their own doctor or through the various out-patient departments of hospitals and through dispensaries.

There is no space in this article for a description of other means employed to maintain and improve the health of school children, such as the arrangements for physical instruction, teaching of swimming, games in the field provided by the Board, and co-operation with the Medical Officer of Health in all matters relating to infectious diseases. The object of the article has been rather to describe the treatment carried out by the Board to remedy certain defects and conditions.

XVII.—LEGAL POWERS AND ADMINISTRATIVE REGULATIONS.

By W. LESLIE MACKENZIE, M.A., M.D., LL.D., F.R.C.P.E.

1. THE Notification of Births Act, 1907, was an adoptive Act. In the course of some seven or eight years it had been adopted by local authorities representing over 60 per cent. of the population of Scotland. Its adoption had, in many cases, been followed by appointment of health visitors, both official and voluntary. The essential points of the Act were that, when a birth took place, an obligation was placed on the father of the child, if residing in the house where the birth took place at the time of its occurrence, or on any person attending on the mother at the time or within six hours after, to notify the birth to the Medical Officer of Health of the district. The notification had to be made within thirty-six hours after birth. The notification applied to any child born after the expiration of the twenty-eighth week of pregnancy, whether alive or dead.

2. The accumulated experience of seven years resulted in the passing of the Notification of Births (Extension) Act, 1915. The obligation to notify under the 1907 Act and the penalty for not notifying remain the same; but the 1915 Act makes notification obligatory over the whole of Scotland. This was one of the primary purposes of the 1915 Act.

Incidentally it may be said that, in several areas, the Medical Officers of Health have complained that only a certain percentage of the births are notified. The percentage of notified births has, however, tended slowly upwards. Before approving a child welfare scheme the Local Government Board satisfy themselves that the notification of births is well carried out in the district. Notification is the first condition of prompt and systematic action by the Public Health Authority.

3. But the 1915 Act contained another clause of a very comprehensive kind:—

Any local authority within the meaning of the principal Act may make such arrangements as they think fit, and as may be sanctioned by the Local Government Board for Scotland, for

attending to the health of expectant mothers and nursing mothers, and of children under five years of age within the meaning of section seven of the Education (Scotland) Act, 1908.

4. With the new powers conferred on local authorities, *i.e.* the Town Councils in towns and the District Committees in counties, by the Notification of Births (Extension) Act, 1915, we make a new departure, both in principle and in practice. In principle the local authorities have hitherto considered themselves as fulfilling their whole duty when they dealt with the general conditions of health and the special effects of infectious diseases. Even under the Public Health (Scotland) Act, as it stands, this is too narrow an interpretation, and, under the Housing Acts, it is much too narrow; for, as the powers of the Public Health Act are more closely studied, they are found to cover endemic diseases as well as infectious diseases. But the new Act of 1915 removes all possibility of doubt as to the scope of the local authorities' powers. In principle these are no longer governed by questions of infection or disease; they are governed solely by the need for preserving the health of expectant mothers, nursing mothers, and children up to the age of five. In practice the difference is also very great; for hitherto the institutions required of local authorities have practically been limited to hospitals for infectious diseases, including sanatoria for tuberculosis. Under the new powers the institutions required are those arising out of the special needs of expectant mothers, nursing mothers, and children under five.

5. To assist the local authorities in the realisation of those very comprehensive powers the Local Government Board has issued a Memorandum expounding the general principles on which schemes should be framed, indicating broadly the main elements of a child welfare scheme, and specifying what activities under the scheme will entitle the local authority to a grant equivalent to 50 per cent. of their approved outlays. Under a scheme it is open to the local authority to arrange for maternity centres where expectant mothers and nursing mothers may come for medical advice and treatment; to establish a system of home visitation by health visitors or doctors; to arrange that skilled and prompt attention shall be ensured to every expectant mother requiring it at her confinement; to secure that hospital accommodation shall be available for dangerous or difficult cases; to arrange that schools for mothers and young women may be established in co-operation with the School Boards or Secondary Education Committees. The local authority may also establish

consultation centres, where children up to the age of five may be brought for medical advice and treatment, and from which they may be visited. They may provide or arrange for hospital accommodation for sick children when satisfactory treatment is impossible at home; for convalescent homes for children in impaired health; for day nurseries or nursery schools wherever these are practicable, and that means in almost every village. They are now, by statute, in a position to prepare such a report of each child as will enable the local authority, through its Medical Officer of Health, to furnish every child of school age with a certified health schedule for presentation on admission to school. Briefly, the local authority is now able to apply public funds in the provision of organised care for the mother throughout her periods of expectancy and nursing, and of the child until it passes from the home to the school.

6. In some of these services the local authority receive Government grants to the extent of half of the outlays. The grants are administered by the Local Government Board for Scotland under the regulations laid down by the Lords Commissioners of His Majesty's Treasury. No grants are given directly to any institution. The local authority must first contribute.

By the present Treasury Regulations expenditure on residential treatment in hospitals, expenditure on payments to hospitals for operations, expenditure on the provision of milk and other foods, including patent foods and prepared or modified milk, are all excluded from participation in grants. Further, where child and maternity consultation centres are provided at an out-patient department of a hospital, special arrangements must be made apart from the ordinary treatment of sick persons in the out-patient department. More recently it has been intimated that the Treasury will sanction grants where local authorities provide a service of midwives, or where they provide nurses for attending cases of measles in the patient's home. Two or three other concessions have been made. For instance, the provision of food to expectant mothers, nursing mothers, and children will rank for grant where the recipients are certified by the Medical Officer of Health to be necessitous, and where the food is certified to be necessary. But the Regulations for the distribution of grant are, at present, under consideration by the Treasury, and it is expected that, in a short time, those Regulations will be issued with further important modifications. At present it is not possible to say more.

The Regulations also contain certain general administrative provisions. For instance, the salaries and appointments of all officers employed by the local authority under a scheme must be approved by the Local Government Board, and no alteration on an approved salary can be made without the consent of the Board. All institutions included in the scheme must be provided with medical superintendence to the satisfaction of the Board. Where any institution included in a scheme is not conducted to the satisfaction of the Board the grant may be reduced or withheld. These general provisions are clearly necessary in the interest of sound administration. But the cardinal financial point of the Regulations is that no institution benefits by the grant unless it is an approved institution formally included in an approved scheme. All grants are paid to the local authority, whose outlays are carefully scrutinised in each grant year. This administrative principle it is important to grasp, for a large number of persons interested in the voluntary institutions have assumed that the method of paying grants in Scotland is the same as in England. This is not so. In England the Board of Education gives grants direct to certain types of institutions—for example, nursery schools. In Scotland no grant is given direct to any institution. In England some institutions dealing with children under five receive grants from the Board of Education, some others receive grants from the Local Government Board. In Scotland all the grants connected with expectant mothers, nursing mothers, and children under five are given through the Local Government Board for Scotland. Unfortunately, several persons interested in infant welfare have failed to note that, in Scotland, no grants are given direct to any institution, and that all grants must come through the Public Health Authority.

7. In this short account I have confined myself to the 1915 Act. There are many other provisions in the Children Act and in other Acts affecting mothers and children under five; but, for practical purposes, the immediately important provisions are those I have sketched.

8. *Conclusion.*—Briefly, we are now in a position to say that the whole period from before birth to the end of the school age has, in form at least, been medically provided for by statute. It is now for the administrative bodies to realise the extended powers conferred upon them.

RECENT ADVANCES IN MEDICAL SCIENCE.

OBSTETRICS AND GYNECOLOGY.

UNDER THE CHARGE OF

A. H. F. BARBOUR, M.D., AND J. W. BALLANTYNE, M.D.

MOTHER AND CHILD WELFARE WORK.

ALREADY in these Abstracts reference has been made to various reports upon the progress which has been achieved in protecting expectant mothers and their unborn infants in France, America, Sweden, and this country (see the *Journal* for March 1916, p. 232; for July 1916, p. 465; and for April 1917, p. 299); but the movement has now greatly widened its scope and increased its intensity so that not only in medical journals but even in the newspaper press numerous contributions to the subject are appearing almost daily, making it impossible to refer to more than a few of them here. For instance, a monthly journal, entitled *Maternity and Child Welfare*, is now being published, and its pages are packed with articles bearing upon the two departments of preventive and curative medicine represented by its denomination; the number for April contained three papers on "Antenatal Hygiene" looked at from different view-points, and there was one on that thorny problem, "Compulsory Notification of Pregnancy." Further, another periodical, *The Child*, which has been in existence for seven years, is giving a large amount of space to Welfare Work; and the April part has communications dealing with "Child Welfare in Scotland," with the "Development of Standards for Child Welfare in the United States," with the "Development of Child Welfare Activities in the State of New York," and with the "Medical Side of Care Committee Work." The subject is also occupying an increasing amount of space in current medical literature in general, and the *Edinburgh Medical Journal* has devoted two entire numbers to its discussion. Conferences, too, are being held in important centres, and everywhere there are signs that the nation as well as the profession is alive to the necessity not only of conserving child life but also of endeavouring to surround the children who are about to be born with such conditions as shall favour their birth in a strong and healthy state. Since the environment of the unborn child is virtually the mother, it follows that child welfare includes care of the expectant mothers of the population.

Since the months immediately following the beginning of the war, Paris has been the centre of an experiment upon a vast scale to supervise the expectant and nursing mothers living in that city. The results for the first year, which were astonishingly satisfactory, were summarised in these columns in the June part of this *Journal* last year (1916); but Professor A. Pinard (*Ann. de gynéc. et d'obstét.*, 1917, 2 ser., vol. xii. pp. 385-413) is far from satisfied with the figures for the second year of the war. He found that although all the protective and preventive agencies under the *Office central d'Assistance maternelle et infantile* were continued (with very slight modifications) during the second year of the war, and although the finances did not fail, yet the mortinatality rate (the still-births), which had fallen so markedly in the first year, rose to practically the same level (7.69 per cent. of births) as it had occupied in the year before the war. Further, the total number of infants abandoned by their mothers, which had also fallen to about a half in the first year, actually rose above what it had been before the war (as 5.21 to 4.98 per cent.). Again, the number of infants put out to nurse outside Paris, which had been 31 per cent. before the war and had fallen to 13.35 during the first war-year, rose again to 22.32 per cent. in the second year. The puerperal mortality among the mothers (0.48 per cent.), although still below that of the pre-war year (0.67 per cent.), was higher than in the first year of the war (viz. 0.46 per cent.). The mortality among the infants from birth to one year, which had been 15.51 per cent. in 1914 and had fallen to 15.20 in 1915, fell a little more, to 15 per cent., in 1916; the mortality in the first three months of life also fell in both the first and second years of the war; but the mortality from one to two years of age, which had been 4.35 per cent. in the year before the war, had risen to 5.12 per cent. in the first year after it and to 5.50 per cent. in 1916. The increase in the deaths in the second year of life was due almost entirely to measles and whooping-cough, and Professor Pinard proposes to meet this factor by more careful isolation of the cases of these two diseases. One of the most satisfactory results of the health campaign in the year following the outbreak of war had been the increase of full-time labours from 33.43 per cent. in 1914 to 56.40 per cent. in 1915, with, of course, a corresponding drop in the percentage of premature births; but in 1916 there was a slight going back again, the percentage of full-time confinements being 54.76 per cent. Further, the number of newborn infants weighing over 3000 grammes, which had increased markedly in 1915, showed a tendency to drop in 1916. Professor Pinard ascribes these disquieting results to the entrance of pregnant and nursing mothers into factories (including, of course, munition works) on account of the high wages there offered to them; and he would have drastic measures introduced to prevent this. He would have all expectant and all nursing women, as well as all women whose confinements had

occurred less than six months previously, forbidden to enter factories to do work therein. He sees only one objection, the diminution in the output of munitions; but he argues that the number of women who are accepting maternity is unhappily very small and that their places could easily be taken by men unfit for military service. "Women," he says, "have only one aptitude for which they are created—that of giving us infants, and these infants are as necessary, as indispensable, for the second victory as munitions are for the first."

In the discussion which followed the presentation of Professor Pinard's paper to the Paris Academy of Medicine (recorded in the *Bull. de l'Acad. de m'ed.*, Nos. for January, February, and March, 1917, pp. 26-42, 116-136, 185-207, 222-254, 260-295, 313-334, etc.) there was considerable doubt expressed as to the correctness of the deductions which he had drawn from the figures submitted, and no little criticism of his proposal to shut out expectant, nursing, and recent mothers from work in factories. Drs. Strauss, Doléris, Charles Richet, Paul Bar, Prenant, Hanriot, Bonnaire, and Kirmisson all contributed to the discussion; and it was finally agreed that the Academy of Medicine should recommend that pregnant women and nursing mothers employed in factories, and more especially in munition factories, should only engage in work requiring moderate effort both in form and duration; that every kind of work exposing the worker to sudden or to slow traumatism, entailing fatigue or causing insufficient sleep, should be forbidden to them; that the half-day system, with a maximum of six hours' work, should be preferably applied in their case; that they should be entirely set free from night work; and that they should be excluded from every employment which, by its dangerous, toxic, or anti-hygienic character, would entail risk to health and thereby compromise the pregnancy and lactation. Other restrictions aimed at preserving four weeks of rest before confinement for all factory workers, and especially for those employed in munitions of war; suggestions were made regarding financial compensation for women prevented by the processes of reproduction from continuing their factory work; and means were recommended for aiding the breast-feeding of the children and the establishment of day nurseries.

Dr. Foster S. Kellogg (*Interstate Med. Journ.*, December 1916, vol. xxiii. pp. 1017-1032) deals interestingly with the work done at the Pregnancy Clinic at Boston between 1911 and 1915. During this time 9250 cases passed through the clinic for prenatal care. Ten health rules for pregnant women are recommended for private practice. These are as follow:—(1) Exercise moderately twice a day, walking to a point just short of tiredness; sit out as much as possible. (2) Daily bath of warm water, followed by cool (not hot or cold), succeeded by brisk rub, except abdomen. (3) Specimen of urine for analysis every month until the seventh, every two weeks thereafter. (4) Diet: meat, fish, or eggs

only once a day. Eight glasses of water a day at any rate, ten is better, much fruit and green vegetables, moderate amounts of potato, bread, butter, and cereals. Do not eat excessively. If three normal meals cause distress, eat less at a time and oftener. (5) Report to physician if (a) bowels do not move every day; (b) headache; (c) swelling of hands, face, feet, or ankles; (d) red discharge ("flowing") in any degree; (e) nausea or vomiting after the third month, before if excessive; (f) blurring of vision; (g) persistent backache or abdominal pain. (6) Report in person or call up for appointment *one* month before expected date of confinement. (7) Do not (a) get tired; (b) swim; (c) dance; (d) play tennis or golf; (e) ride fast, or over one half-hour at a time, in automobile. (8) Do not massage or make applications to breasts or nipples. (9) Avoid obstetrical conversations with friends or relatives. (10) If worried or in doubt, telephone physician immediately. In addition to the many medical and obstetrical advantages to be derived from prenatal care, Kellogg emphasises the instruction of students, and the amassing of accurate data as a basis of study for the advancement of the science of obstetrics, and he instances F. C. Irving's work on the systolic blood-pressure in pregnancy founded upon observations in 5000 consecutive cases in the Pregnancy Clinic in Boston. The following conclusions regarding pregnancy clinics are valuable:—(1) Pregnancy clinics for prenatal care will grow if started, will be accepted by the people, and will educate them rapidly in the appreciation of the value of prenatal care. (2) Thirty per cent. of pregnancies show some abnormality. (3) Four per cent. of pregnancies show definite symptoms of toxæmia. (4) Eight per cent. of pregnancies show some degree of contracted pelvis. (5) Seven-tenths of one per cent. of pregnancies show antepartum bleeding. (6) Two per cent. of all pregnancies are complicated by valvular heart disease, 17 per cent. of which decompensate to some degree under pregnancy clinic care. (7) Prenatal care reduces maternal mortality on the whole, especially from toxæmia and eclampsia. (8) Prenatal care reduces maternal mortality in placenta prævia. (9) Prenatal care reduces maternal mortality in contracted pelvis and morbidity following labour in these cases. (10) Prenatal care gets patients suffering from cardiac disease complicating pregnancy into hospital for treatment when decompensation is slight, and so reduces the maternal mortality in this condition. (11) Prenatal care reduces still-births. (12) Prenatal care reduces fetal mortality in contracted pelvis and in toxæmia. (13) The pregnancy clinic offers an ideal place in which to teach many sides of obstetrics. (14) Pregnancy clinic material, in a well-conducted clinic with a good follow-up system, run with a hospital, offers very valuable data in the study of obstetrics. (15) Postnatal care is nearly, or quite, as important as prenatal care, and, except in one-child sterility, is essentially prenatal care, and should be extensively incorporated into

the work of the individual obstetrician, of a pregnancy clinic, or of a lying-in hospital. Another article, on "Prenatal Diagnosis, the Major Need in Obstetrics," by Dr. Edward A. Ayers (*Amer. Journ. of Surg.*, 1916, vol. xxx. p. 369) presses on the profession the necessity for antepartum clinical training and prophesies great advances in the future.

In an article on the "Rights of the Unborn Child," Professor Barton Cooke Hirst (*New York Med. Journ.*, 1917, vol. cv. p. 241) expects much good to come from the recent agitation and publicity in regard to prenatal care. He makes the following statement, which can hardly be controverted:—"The right of the unborn child to life is undenied and indisputable, but, as a matter of fact, this right is more frequently denied during intra-uterine life than at any other period of man's existence," and he cites the frequency of miscarriage, spontaneous, criminal, and therapeutic. On the other hand, he freely admits the extraordinary delicacy and complexity of the problems which arise when the life of the unborn child has to be weighed against that of his mother.

J. W. B.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

W. B. DRUMMOND, M.D., AND A. DINGWALL FORDYCE, M.D.

MATERNITY AND CHILD WELFARE.

AN American author recently wrote: "When we realise that the infant death-rate in this country varies from 250 per thousand to less than 70, and throughout the world from between 400 and 500 per thousand in China to less than 40 in New Zealand, it is perfectly evident that the infant mortality-rate is largely dependent upon conditions which can be controlled, at least in part, and that a large measure of responsibility attaches to any community whose baby death-rate is unduly large. The death-rate, in other words, is a purchasable commodity. It can be reduced to a minimum if the public is willing to pay the price. We must remember also that, in the large majority of cases in which a forlorn and marantic baby is brought through its critical first year by proper care, the outlook for that baby is almost as good as that of any other; that its life expectancy is practically as long as that of a child who has been robust from birth, so that in the work of saving babies there is a greater incentive and a larger reward than is given to those engaged in other lines of preventive medicine."*

* Knox, *Pediatrics*, November, 1916.

Following upon the Notification of Births Act, 1907, which was an adoptive Act, the Children Act, 1908, was passed. This latter Act is very comprehensive and consists of six parts, viz. :—

PART I.—INFANT LIFE PROTECTION.

This part deals with persons receiving infants for hire or reward. It makes notification within forty-eight hours compulsory, as also notification of change of residence or transference of the baby from one person to another. It deals with visitation, the number of infants who may be received in any premises, and prohibits the insurance of the lives of the infants.

PART II.—PREVENTION OF CRUELTY TO CHILDREN AND YOUNG PERSONS.

This deals with such subjects as suffocation of infants, begging, exposing children to risks of burning, allowing children or young persons to be in brothels, and the punishment of persons causing, encouraging, or favouring seduction or prostitution of young girls. It also deals with warrant to search for or remove a child or young person, and gives power to deal with habitual drunkards.

PART III.—JUVENILE SMOKING.

PART IV.—REFORMATORY AND INDUSTRIAL SCHOOLS.

PART V.—JUVENILE OFFENDERS.

PART VI.—MISCELLANEOUS AND GENERAL.

The Milk and Dairies (Scotland) Act, 1914, besides giving wide powers to the Local Government Board, includes the following among its clauses :—

4. (1) It shall be the duty of the medical officer of health or the sanitary inspector or any other duly authorised officer, as may be determined in writing by the local authority for the purpose, from time to time, and once at least in every year, to inspect every dairy in the district and to report to the local authority whether such dairy is in conformity with this Act and the byelaws made in terms thereof.

(2) It shall be the duty of the veterinary inspector from time to time, and once at least in every year, to inspect the cattle in every dairy in the district, and to report to the local authority the result of every such inspection.

(3) When the medical officer of health or sanitary inspector of any

district is of opinion that any milk consigned to the district from any other district is contaminated or impure, or when the medical officer of health has reasonable ground for believing that any milk consigned as aforesaid is likely to cause any infectious disease or other illness, it shall be lawful for the medical officer of health, sanitary inspector, or veterinary inspector of the first-named district to inspect the dairy from which such milk has been consigned, and to examine the cattle therein, and the dairyman and the persons in his employment shall give all reasonable facilities and assistance to such officers for such inspection and examination.

13. (1) It shall be an offence under this Act for any person to consign, sell, offer, or expose or keep for sale for human food, or to use or suffer to be used in the manufacture of products for human consumption, the milk of any cow which is suffering from tuberculosis with emaciation, or from tuberculosis of the udder, or from any sore on the teats accompanied by suppuration or bleeding, or from any disease liable to infect or contaminate the milk, or of any cow which is giving tuberculous milk, unless he proves that he did not know and had no reason to suspect that the milk was the milk of such a cow.

(2) Where milk is sold or exposed or kept for sale it shall be presumed to be sold or exposed or kept for sale for human consumption, or for use in the manufacture of products for human consumption, unless the contrary is proved.

14. Every dairyman who has in his dairy any cow which appears to be suffering from any sore on the teats accompanied by suppuration or bleeding, or from any disease liable to infect or contaminate the milk, or any cow which to his knowledge is giving tuberculous milk, shall forthwith give written notice thereof to the local authority stating the situation of the dairy.

22. A veterinary inspector may apply to any cow in any dairy within the district the tuberculin or other reasonable test for the purpose of discovering whether such cow is suffering from tuberculosis, provided that no such test shall be applied except with the previous consent in writing of the owner of such cow.

28. A local authority may, subject to the consent of the Board, establish and thereafter maintain depôts for the sale of milk specially prepared for consumption by infants under two years of age.

As a result of the passage into law of the Notification of Births Act, 1907, its consequent adoption by many local authorities in Scotland, the development of agencies and the accumulation of information, an obligatory Act was passed—Notification of Births (Extension) Act, 1915.

Under this Act local authorities are enabled to make arrangements for attending to the health of expectant and nursing mothers and

young children up to the age of five years. The passage in the same year of the Midwives (Scotland) Act, 1915, enabled the local authority to become the "local supervising authority over midwives within such district."

The Local Government Board "will not approve of any scheme, or portion of a scheme, of maternity service unless the midwives employed are qualified for registration under the Midwives (Scotland) Act, 1915." This will assist in the organisation of a satisfactory maternity service.

The Public Health (Venereal Diseases) Regulations (Scotland) Act, 1916, states in Article I. :—

1. Every local authority shall prepare and submit for our approval a scheme—

(a) For enabling any medical practitioner, practising in the area of the local authority, to obtain, at the cost of the local authority, a scientific report on any material which the medical practitioner may submit from a patient suspected to be suffering from venereal disease ;

(b) For the treatment at and in hospitals or other institutions or in their homes of persons suffering from venereal disease ;

(c) For placing at the disposal of medical practitioners such skilled assistance in the treatment of venereal diseases as may be required ; and

(d) For supplying medical practitioners with salvarsan or its substitutes or other drugs for the treatment and prevention of venereal disease.

2. When we have approved the scheme, the local authority shall make arrangements for carrying it into effect at the cost of the local authority.

3. All information obtained in regard to any person treated under a scheme approved in pursuance of this article shall be regarded as confidential.

Article II.—Any local authority may make such provision for the giving of instructional lectures and for the publication of information on questions relating to venereal disease as the local authority may think necessary or desirable.

In a *Memorandum on Schemes of Maternity Service and Child Service*, issued by the Local Government Board, March, 1916, it is stated as follows :—

"In the light of these general considerations, the Board suggest that schemes should, as far as practicable, contain the elements specified in the subjoined outline. It is not expected that every local authority will be able to present schemes so comprehensive, and the Board will be prepared to consider such smaller schemes as the local authorities are able to include in their arrangements. The outline now submitted

is intended merely as a guide, and may be developed on the lines most appropriate to each locality.

“OUTLINE OF SCHEME.”

“1. *Submission of Scheme.*—In submitting a scheme for approval, the local authority should give, in the form prescribed by the Board, full information regarding—

“(a) The duties, special qualifications, and salaries (if any) of medical practitioners, nurses, midwives, health visitors, and other officers to be employed;

“(b) The institutions to be provided or utilised.

“2. *General Provisions.*—In its scheme the local authority should provide for—

“(a) The best practicable utilisation of such voluntary institutions or agencies as may be available in its district.

“(b) The keeping of such records as the Board may require.

“(c) Teaching facilities at any institutions included in the scheme, and approved for that purpose by any Government Department or other authority concerned.

“3. *Health of Expectant and Nursing Mothers.*—In such part of its scheme as concerns expectant mothers and nursing mothers, the local authority should, as far as practicable in its district, provide, secure, or arrange for the following:—

“(a) Maternity centres where expectant mothers and nursing mothers may come for medical advice and treatment;

“(b) A system of home visitation of expectant mothers and nursing mothers;

“(c) Such assistance, when confinement takes place at home, as to ensure that the mother shall have skilled and prompt attention;

“(d) Hospital accommodation when the woman to be confined suffers from illness or any deformity, or when other conditions exist involving danger to mother or child;

“(e) Hospital accommodation for treatment of complications following the birth of the child;

“(f) Co-operation with the school board or secondary education committees in the organisation and conducting of schools for mothers or young women.

“4. *Health of Children under Five Years of Age.*—In such part of its scheme as concerns children under five years of age, the local authority should, as far as practicable within its district, provide, secure, or arrange for the following:—

“(a) Clinics or consultation centres (which may be conducted at a maternity centre), where the children may be brought for medical advice and treatment;

“(b) Hospital accommodation for sick children when satisfactory treatment is impossible at home ;

“(c) Convalescent homes for children in impaired health.

“(d) Day nurseries or nursery schools for children of suitable age.

“(e) Such records as may enable the local authority, through its medical officer of health, to furnish any child of school age with a certified health schedule for presentation on admission to school.

“*Note.*—In regard to day nurseries, the scheme should contain a specific provision fixing the payment to be made by mothers (a) towards the cost of food necessarily provided there for infants ; (b) generally for the care of their children during the day.”

In a *Report by the Medical Officer of Health as to Edinburgh Scheme for Maternity Service and Child Welfare under the Notification of Births Act, 1907 and 1915*, issued July 1916, it is stated in the Introduction :—

“It may in many respects be claimed that in this city there is less necessity for a far-reaching child welfare and maternity scheme than exists elsewhere. It must at the same time be admitted, however, after the facts just referred to, that even here an urgent necessity exists for a properly conceived scheme which will serve to bring together such of the existing agencies as are necessary for its successful carrying out. There have been for many years a plethora of agencies, having for their special object the benefit of the child and mother. Certain of these have, of course, taken an outstandingly prominent position, and have been able to accomplish much substantial work, while certain others have carried on their operations on a lesser scale, and have in some instances attempted to overtake the same object, and even gone over precisely the same ground.

“There can be little doubt that there has in the past been overlapping among some of these excellent agencies. Where such occurs it follows that there may be a loss of time and energy, with a proportionate loss of efficiency. In addition to this there may conceivably be a certain amount of inconvenience, and it may be even irritation, occasioned in the households which form the subject of visitation. The ultimate effect of overlapping would in time be a certain defeat of the object in view.

“One of the objects of the following scheme is so to arrange the duties of each body and institution as to prevent the slightest possibility of this occurring.

“This city is exceptionally fortunate in possessing not only an unusual number of voluntary agencies, but specially of magnificent institutions which can be utilised in the efficient carrying out of a perfected child welfare and maternity scheme. It is conceivable that in some localities a special building will require to be erected for this purpose, but in preparing a suitable scheme here it is only necessary to select and make arrangements with the various hospitals, institutions,

and agencies which are considered necessary in order to fully carry the scheme into effect.

“The Memorandum issued by the Local Government Board does not contemplate the inclusion of every institution, but only those which the framers of the scheme consider necessary. This recommendation has been fully borne in mind in drawing up the various details of the scheme which are to follow.”

A. D. F.

THE CARNEGIE UNITED KINGDOM TRUST.

REPORT ON THE PHYSICAL WELFARE OF MOTHERS AND CHILDREN
—ENGLAND AND WALES.

THIS report has been compiled by Dr. E. W. Hope, Medical Officer of Health for Liverpool, and by Miss Janet M. Campbell, M.D., one of the Senior Medical Officers of the Board of Education, and appears in two volumes. The report in itself is of great practical value, and not only envisages the subject generally, but enters most carefully into minute details. As a report on behalf of an independent, unbiassed body, its publication is of far-reaching importance and great significance.

The larger part of Volume I. is occupied by Returns of Medical Officers of Health on the subject, and by comments and recommendations by them. It also contains a free abstract of legislation and numerous charts and diagrams.

In the body of both volumes the various aspects of the subject are exhaustively dealt with, and general conclusions are arrived at. As regards training for the work, it is stated that enhanced facilities should be afforded "for the training of medical officers of health, health visitors, midwives, voluntary workers, and for enlightening administrative bodies and the people generally." "The fuller and better equipment of training centres, in directions which Government grants or voluntary efforts have not been able to meet, is deserving of the most favourable consideration, and a specific recommendation can be made in this direction." The best groundwork of training for a health visitor is considered to be that of a nurse. "Three conditions seem necessary to produce midwives of the type required to raise the level of midwifery practice throughout the country, as a whole, to a degree of efficiency, which will, as far as is humanly possible, afford a guarantee that the health of women and children entrusted to the care of midwives shall suffer no injury from lack of skill or knowledge. These conditions are—(a) A better and wider training; (b) an improved status; and (c) larger and more certain earnings."

When consideration is had of the carrying out of the work and its administration, we read—"As in many other branches of educational and social reform, a large measure of the best pioneer work in regard to infant and child welfare has been carried out by means of voluntary agencies. Voluntary workers led the way and marked out the path now being followed by central and local authorities. They stimulated and educated public opinion. They formed associations; they created

many admirable institutions, and raised considerable sums of money for establishment and maintenance. They enlisted recruits in all parts of the country; they filled them with enthusiasm, and taught them high ideals. The energy and persistence exhibited by voluntary workers are now finding a reward in the widespread acceptance of the principles and methods which have seemed to them fundamental, and in the recognition by the State of the claims of mothers and children for teaching, assistance, and protection. The lesson has been driven home by the circumstances of the war, and the obligations now generally admitted are not likely again to be set on one side. The present time is a period of transition for voluntary associations. . . . In some areas voluntary institutions have been absorbed by the local authority into a general scheme, and in such cases the voluntary element may be either entirely displaced, or permitted to continue responsible for a part only of the general activities. Whether voluntary associations for infant welfare will eventually disappear, or whether they will be strong enough to continue an independent existence, and fill a place which no purely official organisation can do—even though it may not be precisely the place they at present occupy—remains to be seen.”

“The highest standard of efficiency should be aimed at by all agencies, voluntary or official; each should be encouraged to do really good work; the good work of infant clinics or day nurseries, must not be gauged by the numbers attending; indeed, it may be marred by accepting more infants than the accommodation can meet.”

Since the year 1890, when they were instituted, an ever-increasing number of institutions, known as “Goutte de Lait” and “Consultation des Nourrissons,” have been at work in France and Belgium. Following this lead milk depôts and schools for mothers developed in this country, and infant welfare centres have arisen. In an introductory note the Medical Officer of the Local Government Board says: “Maternity homes are urgently needed, and I know of no social work so likely as the provision of such maternity homes to give immediate results in saving maternal and child life, in diminishing chronic invalidism of mothers, and in enhancing the national welfare.”

It is stated that maternity homes might suitably be founded in small towns or in populous urban districts, and in large towns an increased number of maternity homes on simple lines, established primarily with a view of helping the mothers rather than of training midwives. “The home should be available for normal as well as abnormal cases. Fees should be charged which might vary according to the patient’s income, and according to whether she was treated by her own attendant or by one of the home midwives.”

“The home should not be an isolated unit. Its value would be largely increased if it were associated with any or all of the following activities:—

“(a) An antenatal centre, available not only for intending patients, but for other women in the neighbourhood.

“(b) A school for mothers, or infant welfare centre, also available for any women who desire to attend.

“(c) A system of home helps qualified to do the work of the house during the mother's illness.

“(d) A small resident nursery for the children below school age of patients in the home.

“(e) Post-graduate classes for the midwives of the district.

“Another institution which may usefully be associated with a maternity home is a pre-maternity or rest home, where expectant mothers can spend the last few days or weeks of their pregnancy.”

With respect to illegitimate children the report states :—

“The claims of the illegitimate child are very insistent. A pressing requirement, in the interest of illegitimate children in this country, is a home where they could be received temporarily, while the mother could go out to daily work or to a permanent situation. The mother usually lacks money, and the child is too frequently left with people who care nothing for it, and is in many cases neglected, or even starved.”

Play centres and playgrounds are to be regarded as having two main objects—“First, to improve the bodily and mental development of the children; and, secondly, to prevent juvenile crime or mischief by offering an attractive alternative to the streets.” “In America special training courses in play for teachers and for play leaders have been established. In Chicago, for example, the course extends for over a year, and includes lectures and practical work in the Chicago playgrounds. Pittsburg University has appointed a Professor of Play and offers two courses of instruction in play—a one-year course and a two-year course. Wisconsin University has a Professor of Physical Education and Play, and many other cities make special provision for a training in play and games.”

In the development of such directed play “the co-operation of societies accustomed to handling children should be secured, such as Boy Scouts, Girl Guides, Girls' and Boys' Clubs and Brigades, as well as of those societies which are primarily concerned with the provision of play.”

In Volume I. of the report it is stated : “A careful survey of the whole subject reveals many needs, some of which may be, or are being, dealt with by local authorities, local philanthropy, or both. It is, however, perfectly obvious that there remain some pressing necessities for which there is as yet no adequate provision, nor prospect of making it. Amongst them are the following, viz. :—

“(1) The provision in suitable localities, and under appropriate conditions, of maternity homes for the benefit of outlying rural populations.

“(2) The establishment of welfare centres to meet the recognised needs of pre-maternity and infancy, with which may be associated day nurseries. The need of providing for the better care of illegitimate infants calls for careful consideration.

“(3) Provision for the improvement and better equipment of the means of education in the various branches of the science of public health, and for the encouragement of further research into the circumstances adversely affecting infancy and motherhood.”

In Volume II. it is stated : “The foregoing consideration of agencies concerned with infant welfare appear to lead to the following conclusions :—

First, that in respect of the practice of mothercraft, and the rearing and management of young children between infancy and school age, there is a problem to be solved, a problem which is of vital importance to the wellbeing of the State.

Secondly, that the methods by which the problem can best be dealt with arrange themselves in relation to three types of institutions, namely, schools for mothers and infant welfare centres, day nurseries, and nursery schools.

Thirdly, that its solution depends, in part at least, upon an effective organisation of voluntary effort, which would bring to this task a spirit and a service essential to the proper solution of a problem so personal and so domestic. And,

Fourthly, that the fundamental principles always to be borne in mind in the organisation and application of such methods include a full recognition—First, of an educational spirit and educational methods in a wide sense ; and, secondly, of the physical basis of all true nurture.”

In this report vistas which have for long been before the eyes of some are placed before the eyes of all. The subject is here dealt with broadly and yet practically.

Possible lines of development are considered and immediate practical details are discussed. The time is at hand when general realisation will come of the fact that the subject is not only, though primarily, medical, in the widest sense of the term, but is so far-reaching and so all-pervading as in its full development to be a nation's work, and in its degree of development the index of the sensitiveness of a nation's conscience.

A. D. F.

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(*Abs.*)=Abstract. (*Ed.* = Editorial Note.

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